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VOLUME XXVI

1937

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BOTANICAL STUDIES

IN THE

UINTA BASIN OF UTAH AND COLORADO

BY

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PITTSBURGH, PA.
ANNALS OF THE CARNEGIE MUSEUM
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TO

MY FATHER AND MOTHER

WHO ENCOURAGED MY

EARLY CURIOSITIES

BOTANICAL STUDIES IN THE UINTA BASIN OF UTAH AND COLORADO

By Edward H. Graham

(Text Figure 1; Tables 1–5; Plates I–XIII.)

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BOTANICAL STUDIES IN THE UINTA BASIN

INTRODUCTION

The present paper is the result of three Carnegie Museum botanical expeditions to the Uinta Basin in the summers of 1931, 1933, and 1935, and subsequent studies upon the observations and collections made during those trips. Some additional collections, now in the Carnegie Museum Herbarium, have been incorporated into the treatment, and a few specimens not in the Carnegie Museum have been consulted. The work was undertaken because of a general interest in the region due to the Carnegie Museum's many years of paleontological investigation there, whetted by the fact that certain parts of the Basin had never been visited by botanists. In addition, the Basin offered a neat physiographic entity which provided a naturally circumscribed area to which botanical activity might profitably be confined, the results of which might prove interesting.

We believe the results have proved more than interesting. In the present work 1,104 species of vascular plants are recorded from the Basin, an area of some 12,000 square miles for which no list of species was previously available. A number of range extensions are recorded, some species have been collected for the first time since their discovery many years ago, thus verifying their taxonomic authenticity, and a few novelties are reported. These data now assembled concerning the floristic composition of the Uinta Basin are being used in phytogeographic studies of the area which are now in progress. In addition, the present paper includes a discussion of the altitudinal vegetation zones and the plant communities of the region, a result of the present investigations. However, this work is not to be considered a complete and exhaustive treatment. It is, instead, a sketch of the botany of the region painted with rather broad strokes, and is presented as a contribution to the botanical knowledge of Utah and Colorado and the intermontane West.

The word Uinta is sometimes spelled with a final "h," as Uintah,

but in this paper the usage of the United States Geological Survey, which follows the standard set by the United States Geographic Board, is followed. This standard is to spell the name of the mountains, reservation, river and valley without the final "h," but the name of the county and village (in Weber County) with the final "h," probably to maintain spelling adopted in early legal matters.

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HISTORY OF EXPLORATION

PRE-SETTLEMENT PERIOD

Concerning the earliest human occupation of the Uinta Basin, Reagan (1934 p. 55) states that "following in the course of time, Basket Makers, Pueblos, Fremont savages, and probably other Indian races succeeded each other in this region in a somewhat successive order. . . The Utes, who are probably descendants of the Basket Makers, through the Fremont peoples, then came on the scene. Next came the white man."

The earliest white men to penetrate northeastern Utah were the Spanish padres, of whom Escalante is believed the first to reach the Uinta Basin. Freeman (1923 p. 31) writes that "Don Juan Maria de Rivera had gone as far as the Grand and Gunnison in 1761. . . Fray Alonso de Posadas, penetrating farther than Rivera, had reached the other great branch of the Colorado, naming San Buenaventura the river we now call the Green. . . He [Escalante] reached this river on Sept. 13th [1776] and made camp at a point Harris believes to have been about opposite to the present site of Jensen. Escalante described the place where he camped on the river as 'a fine plain abounding in pasturage and fertile, arable land, provided it were irrigated, which might be, perhaps, a little more than a league in length, entering in between two mountains; the space taking the form of a corral; and the mountains coming so close together that one can hardly distinguish the opening through which the river flows.'" From his camp near Jensen, Escalante crossed the Green River and proceeded (Reagan 1934 p. 55) southwestward to a bluff from which he could see the junction of the White and Green Rivers to the south,

thence westward to the junction of the Uinta and Duchesne Rivers, thence westward across the Basin rim to Utah Lake, where his party decided not to continue to Monterey, (his intended destination overland from Sante Fe) but returned to Sante Fe, New Mexico, by way of the Crossing of the Fathers on the Colorado River.

The next white man to come to the Basin arrived nearly a half century later. This was Provot, a French trapper. Reagan (1934 p. 56) states that "Etienne Provot seems to have visited the Uintah region in 1824 and it also seems probable that he was with Ashley on his memorable trip of 1825."

H. C. Dale (1918 p. 51), in discussing Ashley's travels and journal, writes that the Astorians, Northwest and Hudson's Bay Companies trapped north of the forty-second parallel, "leaving the task of discovery and exploration south of that line to American trappers and traders, chief among whom were William H. Ashley and Jedediah S. Smith. American enterprise and discovery touched British enterprise in the upper valley of Green River, in the Bear Lake region, about the Great Salt Lake, across Nevada, and in northern California and southern Oregon." On April 21, 1825, Ashley with six men started down the Green River from a point about 15 miles north of the mouth of Sandy Creek, reaching Red Canyon May third. Successfully navigating the river rapids from there through Split Mt. Canyon, they reached the mouth of the Duchesne River where they cached the cargoes of their boats while they continued down the Green River fifty miles through Desolation Canyon. Of this country Ashley (loc. cit. p. 150) says "the whole of that distance the river is bounded by lofty mountains heaped together in the greatest disorder, exhibiting a surface as barren as can be imagined. This part of the country is almost entirely without game. We saw a few mountain sheep and some elk, but they were so wild, and the country so rugged that we found it impossible to approach them." With the help of horses obtained from the Indians, Ashley then returned to the mouth of the Duchesne River, up which he travelled to its source. He further states in his diary (loc. cit. p. 152) that this part of his travels was "through a mountainous sterile country. From the head waters of Tewinty [Duchesne] River I crossed a range of lofty mountains nearly East and West, which divide the waters of the Rio Colorado [Green] from those which I have represented as the Bueanaventura [tributaries of Weber River?]. This range of mountains is

in many places fertile and closely timbered with pine, cedar, quaking-asp, and a dwarfish growth of oak; a great number of beautiful streams issue from them on each side, running through fertile valleys richly clothed with grass." Ashley then continued down the upper Weber and, swinging eastward, re-joined his other groups at the general rendezvous on Henry's Fork. Ashley was thus the first white man to navigate the dangerous waters of Lodore and the contiguous canyons of the Green River, and likewise the first to cross the Uinta Mountains.

Ashley also states (see Dale 1918 p. 151) that "they [Eutau Indians] also informed me that all the country known to them from South to West from Tewinty [Duchesne] River was almost entirely destitute of game, that the Indians inhabiting that region subsist principally on roots, fish, and horses [which they obtained at an early date]. The Eutaus are a part of the original Snake nation of Indians. They have no fixed place of residence but claim a district of country which (according to their representation) is about one hundred and fifty miles long by one hundred miles wide, to which their situation at that time was nearly central [south of the mouth of the Duchesne River]". The district claimed by the Indians was essentially the Uinta Basin area.

Reagan (1934 p. 58) treats the evidence concerning subsequent white traders to the region, stating that "on August 6, 1930, the writer found a carving on 'Inscription Rock,' east of Uintah River, east of Mrs. Daniel's place, about half way between Fort Duchesne and White Rocks, near where the Robidoux fort was located, which reads: 'Denis Julien, 1831'. . . This Denis Julien either acted as guide for Robidoux or accompanied his trading expedition to the Uintah Basin in 1831."

Kit Carson spent the winter of 1833-34 at a fort he built at Ouray, remains of which Reagan also found. Reagan (1934 p. 59) quotes Kit Carson's story as told to Mrs. Blanche C. Grant (1934) in which Carson is quoted as saying that "we followed the Spanish Trail that leads to California [from Taos] till we struck White River, took down White River till we struck Green River, crossed Green to Winty (Uintah),[1] one of its tributaries. There we found Mr. Robidoux. . .

[1]Tewinty, Winty, or an Indian word of similar sound, is apparently the origin of the English word Uinta. It was applied by early travelers to either the Duchesne or Uinta Rivers, just as subsequently the present Duchesne, below the mouth of the Uinta, has been at times confusingly called the Uinta River.

The snow was now commencing to fall and we concluded to go into winter quarters. We found a place which answered every purpose on the mouth of the Winty. . . . Some trappers came to our camp and informed us that Fitzpatrick and Bridger were on Snake River encamped. In March (1834), we struck out for the purpose of finding their camp. In fifteen days we found their camp."

Reagan (1934 p. 56) further states that "the first year long abode of White Men in Utah seems to have been the Indian trading post which was established at an Indian village near the present White Rocks, Uintah County, about 1832, by Antoine Robidoux, and called Fort Robidoux sometimes but more frequently, Fort Uintah or Wintey. . . . It was a branch of the Robidoux trading post on the Gunnison River just below the Uncompahgre in Western Colorado. Both posts were on the trail from Taos to Fort Hall; and Fort Uintah was on the trail from Utah Lake to the upper Platte outposts. . . . The Indians overwhelmed the post, and destroyed it in 1844."

Thomas Nuttall, with John K. Townsend, left Independence, Missouri, April 28, 1834 on the Wyeth Expedition (see Jepson 1934) and went through what is now the town of Green River, Wyoming, but passed to the north of the Uinta Mountains, thus missing the Basin area.

Denis Julien, whose inscription Reagan found between Fort Duchesne and Whiterocks ". . . took a trip down the Green-Colorado River in 1836. Here he carved his name on the rock walls at five different places. . . The last inscription is dated '16 Mai, 1836,' and it is supposed that he actually tried to navigate the dangerous rapids of Cataract Canyon and that he lost his life in those swirling waters" (see Reagan 1934 p. 58 footnote).

In 1839, Dr. F. A. Wislizenus and others were at Brown's Hole, but this is outside of the Basin on the Green River at the base of the north slope of the north Basin rim (see Reagan 1934 p. 60 footnote).

Reagan (1934 p. 60; see also Williams 1845) further writes that, in the summer of 1842, Joseph Williams went down the Wintey (Uinta) River to Fort Robidoux, thence across Green and White Rivers to Sugar Creek (Bitter Creek, about 45 miles southeast of Ouray).

Rufus B. Sage, in October, 1842, entered the Uinta Basin from the west. Reagan (1934 p. 61, quoting Sage 1846) quotes from Sage's Journal as follows: "Crossing the Del Norte, we soon after struck

into a large trail bearing a westerly course; following which, on the 13th inst., we crossed the main ridge of the Rocky Mountains by a feasible pass at the southern extremity of the Sierra de Anahuac range, and found ourselves upon the waters of the Pacific. Six days subsequent we reached Roubideau's Fort, at the forks of the Uintah." In the same year (Reagan 1934 p. 63; see also Drury 1936) "Marcus A. Whitman, with Dr. Lovejoy, Oregon Protestant missionaries, spent a few miserable days in Northern Utah, because of the terrible severeness of the weather, part of which was at Fort Winte (Uintah) about October 18-20, 1842."

The first botanical collections which were made in the Uinta Basin were those of two of the Fremont expeditions. The first was in 1844, when Fremont entered the Basin from the west in May. Writing of this expedition, Warren (1859 p. 49) states: "Turning now to the east, up the Spanish Fork, he [Fremont] crossed the Wasatch mountains at the source of White [Price] river. Continuing on toward the east, he passed north of the sources of Uinta [Strawberry] river, between it and the Uinta mountains, arrived at Green river and crossed it at 'Brown's Hole.'" Fremont thus left the Uinta Basin and continued up Vermilion Creek and eastward. Of his travel across the Basin that year, Fremont (1845 pp. 278-279) himself writes that "after infinite difficulty, and the delay of a day, we succeeded in getting the stream [Lake Fork] bridged, and got over with the loss of one of our animals. Continuing our route across a broken country, of which the higher parts were rocky and timbered with cedar, and the lower parts covered with good grass, we reached, on the afternoon of the 3d [June] the Uintah fort, a trading post belonging to Mr. A. Roubideau, on the principal fork of the Uintah river. . . On the morning of the 5th we left the fort [Uintah] and the Uintah river, and continued our road over a broken country, which afforded, however, a rich addition to our botanical collection; and, after a march of 25 miles, were again checked by another stream, called Ashley's fork. . . . In the afternoon of the next day we succeeded in finding a ford; and, after travelling fifteen miles, encamped high up on the mountain side [7300 ft.], where we found excellent and abundant grass, which we had not hitherto seen. A new species of *elymus*, which had a purgative and weakening effect upon the animals, had occurred abundantly since leaving the fort."

The next year Fremont and his party left Bent's Fort, Colorado,

August 16, 1845, and crossed the Uinta Basin westward. Of this, Warren (1859 p. 50) writes that "continuing west they crossed Blue [Colorado] river, reached the sources of White river, and travelled near it to its mouth. From the crossing of Green river they travelled up the left [North] bank of the Uintah [Duchesne] to Duchesne's Fork [the Duchesne River above its junction with the Strawberry River], intersecting Captain Frémont's trail of 1844 a short distance east of the point where it crossed that stream; thence they passed up Morin's [West?] Fork, crossed the divide between the waters of the Colorado river and those of the Great Salt Lake, near the head of Timpanogos [Provo] river, which they followed down to its junction with Utah Lake."

In 1849, or earlier, an unknown party (see Dale 1918 p. 145 footnote) presumably en route to California, left a Dutch oven and other pieces of camp equipment just below Disaster Falls. These were not left by Ashley, as Powell, later on his first voyage, supposed. Manly notes seeing them (see Freeman 1923 Chap. VI) in 1849, as recently abandoned together with a note on a tree. Certainly there must have been a number of trappers who visited the Uinta Basin, overland and by way of the Green River also, who left no such practical traces and who wrote no tales to tell of their experiences.

Capt. H. Stansbury, on his way west in 1849, skirted the north side of the Uinta Mountains west of Fort Bridger, and returning in 1850 (August) left Salt Lake City and went to Kamas Prairie, outside the Basin's northwest rim, there exploring the heads of the Weber and Timpanogos rivers, returning to join the rest of his party down the Weber. So, although not actually in the Uinta Basin, this party worked its northwest rim (see Warren 1859 p. 59).

Of the explorations and surveys to ascertain the most practicable and economical route for a railroad from the Mississippi River to the Pacific Ocean, only two concern the Uinta Basin environs, neither entering the Basin proper.

One of these was the survey and exploration near the 38th and 39th Parallels, under the leadership of Capt. J. W. Gunnison, in 1853. Coming from the east the party left San Luis valley by way of Sawatch Creek, ascended this to Coochetopa Pass and descended to Grand River, which they followed (Gunnison and Colorado Rivers), finally crossing Green River below the mouth of the White (Price) River, continuing westward and crossing the Wasatch mountains to a

branch of the Sevier. Later the party separated and Capt. Gunnison, F. Creutzfeldt, the botanist, and six others were killed by the Ute Indians. Lieut. E. G. Beckwith then took charge and proceeded to Salt Lake City, where the winter was passed (see Vol. II Pac. R. R. reports, and Warren 1859).

The other of these two railroad expeditions was Lieut. Beckwith's survey near the 41st Parallel in 1854, a continuation of Gunnison's survey of the 38th and 39th Parallels. They left Salt Lake City in April, went up the eastern shore of Great Salt Lake, up Weber River to White Clay Creek, crossed divide between it and the Bear, along the head waters of Muddy Creek and Black's Fork to Henry's Fork of Green River, which they followed nearly to its mouth. They returned by way of the same route to Weber River up which they went to Kamas Prairie, thence crossing the divide to Timpanogos (Provo) River to Utah Lake and Salt Lake again (see Vol. II Pac. R. R. reports, and Warren 1859 p. 75). The botany of these two surveys was worked up by Torrey and Gray as part of Vol. II, Pac. R. R. reports, and most of the specimens collected are in the Gray Herbarium, the New York Botanical Garden, and the U. S. National Herbarium.

Capt. J. H. Simpson (1859 map) in 1858, engaged in a reconnaissance of wagon road routes in Utah Territory, travelled from Camp Floyd (Cedar City) up Timpanogos (Provo) River, across Kamas Prairie, Weber River, White Clay Creek, Bear River and Muddy Fork to Fort Bridger. He did not get into the Uinta Basin, however, in spite of the fact that later maps show his route there (i.e. Wheeler 1889 and Wheeler Appendix JJ, 1876, which also show Escalante's route south of that now believed to have been taken).

Major J. W. Powell encamped at winter quarters on the White River about 120 miles from its mouth and, while exploring there, visited the eastern part of the Basin. He (1875 p. ix) writes: "The winter of 1868-'69 proved favorable to my purposes, and several excursions were made, southward to the Grand, down the White to the Green River, northward to the Yampa, and around the Uinta Mountains." It is believed that while engaged in these explorations Powell became interested in navigating the canyons of the Green and Colorado Rivers. At any rate, starting from Green River City (Wyoming) May 24, 1869, on the first of his memorable Grand Canyon voyages, Powell spent a month navigating and studying the

canyons of the Green River as it slices through the east end of the Uinta Mountains, arriving at Island Park on June 22nd. Powell called the gorge just above Island Park, Whirlpool Canyon, and that below, Split Mountain Canyon. Standing at the west edge of Blue Mountain, which he called Mt. Hawkins, east of their camp in Island Park, Powell (loc. cit. pp. 38 and 39) wrote: "Turning to the right, the park is below us, with its island groves reflected by the deep, quiet waters. Rich meadows stretch out on either hand, to the verge of a sloping plain, that comes down from the distant mountains. These plains are almost naked rock, in strange contrast to the meadows." North of the mouth of the Uinta River Powell (loc. cit. p. 40) observes: "June 27.—Now our way is along a gently flowing river, beset with many islands; groves are seen on either side, and natural meadows, where herds of antelope are feeding." Powell refers to the stretch between Split Mountain and the mouth of the Uinta as Won-sits Yu-av or Antelope Valley. This is the central Basin area. Freeman (1923 p. 226) says that Powell, in writing of his first trip, incorporated things which happened on the second, about which he published no report.

Writing further of the Uinta Basin country, Powell (1875 p. 41) states: "The course of the river [White], for much of the distance [above its junction with the Green], is through Canyons; but, at some places, valleys are found. Excepting these little valleys, the region is one of great desolation: arid, almost treeless, bluffs, hills, ledges of rock, and drifting sands. Along the courses of the Green, however, from the foot of Split Mountain Canyon to a point some distance below the mouth of the Uinta, there are many groves of cottonwood, natural meadows, and rich lands. This arable belt extends some distance up the White River, on the east, and the Uinta, on the west, and the time must soon come when settlers will penetrate this country, and make homes." Powell (loc. cit. pp. 166-167) writes further: "South of the Uinta Mountains, and beyond the hog-backs on either side of the river, is a district known to the Indians as Wa-a-ri-chits, or the Yellow Hills. This country is elaborately embossed with low, rounded, naked hills. The rocks from which they are carved are yellow clays and shales . . . the whole country is carved by a network of water-ways, which descend rapidly toward Green River, and the intervening hills are entirely destitute of vegetation." Powell walked up the Uinta River to the Indian agency to "replenish our

mess kit, and, perhaps, send letters to friends" on July 1 (loc. cit. p. 41).

On an island a short distance below the mouth of the Uinta, a hunter and Indian trader friend of Powell's had a garden. A member of the party suggested potato tops were good greens and "anxious for some change from our salt meat fare, we gather a quantity and take them aboard. At noon we stop and cook our greens for dinner; but soon, one after another of the party is taken sick: nausea first, and then severe vomiting, and we tumble around under the trees, groaning with pain, and I feel a little alarmed, lest our poisoning be severe. Emetics are administered to those who are willing to take them and about the middle of the afternoon we are all rid of the pain. Jack Sumner records in his diary that 'potato tops are not good greens on the sixth day of July' " (loc. cit. p. 45).

Further on his voyage, after climbing out of Desolation Canyon to the Tavaputs Plateau, Powell (1875 pp. 47-48) wrote: "From this point a fine view is obtained. A long plateau stretches across the river, in an easterly and westerly direction, the summit covered by pine forests, with intervening elevated valleys and gulches. The plateau itself is cut in two by the cañon. Other side cañons head away back from the river, and run down into the Green. Besides these, deep and abrupt cañons are seen to head back on the plateau, and run north toward the Uinta and White Rivers. Still other cañons head in the valleys, and run toward the south. The elevation of the plateau, being about eight thousand feet above the level of the sea, brings it into a region of moisture, as is well attested by the forests and grassy valleys. The plateau seems to rise gradually to the west, until it merges into the Wasatch Mountains. On these high table lands, elk and deer abound; and they are favorite hunting grounds for the Ute Indians." A few botanical specimens were collected on this and Powell's later trip over the same course (Ward, with Powell 1875); they are in the National Herbarium at Washington.

At the time of Powell's first voyage in 1869, Green River, Utah, was only an Indian raft crossing, while Green River, Wyoming, was a frontier town. The Uinta Basin was still unsettled.

During the United States Geological and Geographical Survey of the Territories in 1870, "a permanent camp was established at the latter point [Fort Bridger], from which numerous excursions were made, especially to the Uintah Mountains, the northern slopes of

which were explored" (see Wheeler 1889 p. 700). H. D. Schmidt was naturalist on this expedition. In 1877, the Survey carried on "critical paleontological work, under Dr. C. A. White, who examined the geological formations that lie on both sides of the Rocky Mountains and on the north and south of the Uintah mountains" (loc. cit. p. 707).

In 1871 Powell made his second trip down the Green and Colorado Rivers. The expedition left Green River, Utah, May 22, 1871. Pack trains carried extra supplies overland to the mouth of Uinta River, where the river party continued on August 5th while Powell went to Salt Lake City to look after another overland party which was to meet the boats at the mouth of Dirty Devil (Fremont River). Powell rejoined the river party at Gunnison's Crossing (Green River, Utah?) with supplies to last to the Crossing of the Fathers, as it was impossible to get to the mouth of the Dirty Devil. They passed the winter at the mouth of the Paria. August 17th of the next year, 1872, they pushed on down the river, after having explored some of the surrounding country. On September 7th (?) the voyage was ended at the mouth of the Kanab, instead of going through as had been planned (see Freeman 1923 Chap. XII; also Dellenbaugh 1902).

Of the Geological Exploration of the 40th Parallel, the 1869 expedition reached the west end of the Uinta Mountains. It is reported (see Watson 1871 p. xxiii.) that "the next season's [1869] collection was begun at Salt Lake City on the 17th of May . . . from the 30th of July to the 13th of August, [was] spent in the Uintas at the head of Bear River. A brief trip was also made early in July to the divide between the Provo and Duchesne Rivers in the same mountains." Watson was the botanist on this trip and his collections are in the U. S. National Herbarium. In 1871 this survey reached the Uinta Mountains again, where "the full complement of topographical work was prevented by forest fires of great extent" (see Wheeler 1889 p. 657). There was no biologist on the 1871 expedition.

In 1871, W. A. Jones, in order to ascertain the character and extent of streams, timber, and to find a wagon road from Fort Bridger to the Uintah Indian Agency, and examine Green River (latter not done because of poor transportation!) "left Omaha June 11, 1871, and arrived at Fort Bridger June 29, proceeding south along the west branch of Smith's Fork (9 miles distant), thence ascending this stream

24 miles, thence to Gilbert's Pass, thence eastward 12 miles to the headwaters of a branch of Lake Fork called Big Spring Creek, which was followed for 12 miles to within 14 miles of its mouth on the Uintah River. After examination and survey in this vicinity the Uintah Valley Agency, on the North Uintah River, was reached via the valley of this stream. From thence northeast across Tau-a-wah to Ashley Creek, tributaries of Green River; thence northerly to near the summit of the Mountains; thence northwesterly via the heads of Hunting-Ground Creek, Sheep Creek, and Burnt Fork to Henry's Fork, near boundary between Utah and Wyoming; thence northwesterly through the 'Bridger Bad Lands' to Sage Creek, northerly along valley of Cottonwood Creek, and due westerly across to Smith's Fork, arriving at Bridger August 19, 1871." Thus a "practicable wagon route was found from Fort Bridger to the Uintah Valley Agency via the pass at the head of the Main Branch of Smith's Fork, discovered by Lieutenant-Colonel Gilbert, Seventh Infantry" (see Wheeler 1889 Vol. I Appendix F. p. 639).

None of the expeditions made in connection with the U. S. Geographical Surveys West of the 100th meridian reached the Uinta Basin, unless they touched its easternmost extension in west-central Colorado.

In 1873 Thomas C. Porter visited the north slope of the Uinta Mountains, having collected in that year at Gilbert Meadows.

C. C. Parry (1876 p. 145) writes of summer botanizing in the Wasatch Mountains, 1875, as follows: "Although the early botanical collections of Nuttall, Fremont, Stansbury, H. Engelmann, and others, over this and adjoining districts, together with the later very thorough examinations by Mr. Sereno Watson, the results of which are embodied in the Botanical Report, King's Geological Exploration of the 40th Parallel, Vol. V, left little to expect in the way of discovery of new species, I was nevertheless desirous of making a somewhat continuous series of observations from the Eastern Rocky Mountain District, with which I was tolerably familiar, to the Pacific Coast, and especially of noting the geographical range of the Coniferae from East to West." He made his headquarters near Spring Lake at the ranch of B. F. Johnson, near Mount Nebo in late June and collected only in the Wasatch Mountains, not entering the Uinta Basin.

SETTLEMENT TO THE PRESENT

The Uinta Basin was not settled until 1873 when stock ranches were established in the Ashley valley near the present site of Vernal. The Uinta Indian Reservation Survey was made in 1875. In 1878 a number of Mormon colonists came in and in 1879 the Ashley Central Canal was begun, and more settlers followed. The Meeker massacre was in this year and it is believed that the Utah Utes participated, planning to kill all the white settlers in the Basin, but the Ashley valley people were warned by friendly Utes. Twenty families gathered for protection at Vernal, the Dry Fork people having fled to Old Ashley. A few people spent that winter on White River, above Ouray. The winter of 1878-79 had been very mild, but the winter of 1879-80 was very cold and snowy and the people of the Basin settlements were cut off from the outside and were believed massacred. In May, a party went to Heber City for supplies, but because of snow and, on the return trip, high water in the Duchesne River, they did not get back until July 4 (1880). In May supplies came from Green River, Wyoming. In the Spring of 1880, Uintah County was organized and by that time there were approximately eighty families in the Basin. (See Vernal Express, pre-Christmas numbers 1934 and other years).

There were two trails over the Uinta Mountains used by the Ute Indians. They were: (1) Soldier Trail, west of Gilbert Peak, believed used by General Marcy, in 1857, on a trip to Mexico for emergency supplies for the army sent to Utah under General Albert Sidney Johnson, and (2) Lodgepole Trail (later called Thornburg road) from Burnt Fork Post Office, Wyoming, to Ashley, Utah. The former trail was used by General George Crook in 1881 to ascertain a wagon road over the Uinta Mountains. It was found impracticable and Lodgepole Trail recommended.

In 1880 the government wanted to move the White River Ute Indians from Colorado to the Uinta Ute reservation in northeastern Utah. So Fort Bridger was regarrisoned until a fort south of the Uintas could be built. In 1881 a military post and small garrison were established on Ashley Creek near Vernal, Utah, called Fort Thornburg after the man who was killed by White River Utes in 1879. In 1882 a contract was let to carry freight from Carter Station on the Union Pacific Railroad by way of Fort Bridger to Fort Thornburg. In May, 1882, William A. Carter started with twenty-two

6-mule teams and wagons. Three weeks later, after much work in snow and mud, the freight was delivered. Fort Thornburg was later moved to Green River and in 1883 (or shortly after) Fort Duchesne was established and Thornburg road was of no further use and so abandoned. (See Vernal Express Dec. 13, 1934).

The late Marcus E. Jones once informed the writer that in the 1880's he went up Weber River to Beaver Lakes above Peoa by wagon, then afoot to near the top of the Uinta Mountains, and later made three trips to the top of La Motte Peak and to Bear River from Chalk Creek to a meadow at 9000 feet, to collect Watson's types. Still later he went by bicycle to the Bridger region and Ham's Fork to collect Nuttall's types, and in the 1890's rode a bicycle from Colton to Theodore (Duchesne?), to Ashley (Vernal), to Mack, Colorado, on the old stage route. However, all of Jones's specimens which we have seen from the Uinta Basin were collected in the year 1908. So far as we are able to determine, Marcus E. Jones was the first botanist to make plant collections in the Basin alone, unattached to a large expedition. His specimens are widely distributed in American herbaria.

There is in the Carnegie Museum herbarium an "art mount" specimen of three species, native to the region, labeled "L. Lesquereux, Uinta Mts., Utah." It is possible that he and other early geologists and paleontologists have touched the outer confines of the Basin during their explorations, but their botanical collections have been of little significance.

Nathan Galloway crossed the Uinta Basin by way of the Green River, in 1895, trapping, and later repeated his feat, going all the way to Needles, Arizona. Others, notably the Kolb brothers in 1911 (see Kolb 1920) and the U. S. Geological Survey party of 1922 (see Woolley 1930), the latter party making a complete topographic map and profile of the Green River from Green River, Wyoming, to Green River, Utah, have also made the river trip, but are of no significance to the present treatment at this point. This brings us to the turn of the century, with only Fremont and Jones having made botanical collections in the Basin proper and crossing it, and Watson having collected on the northwest rim.

Since the beginning of the present century, several botanists have visited the Uinta Basin, especially the south slopes of the Uinta Mountains. None have made more than itinerant collections, how-

ever, and while plant specimens from southern and western Utah are not rare in our larger herbaria, until the present studies were undertaken, specimens from northeastern Utah were surprisingly few. In 1902 Leslie N. Goodding touched the area, collecting especially near Dyer Mine and Brush Creek Canyon. His collections and notes are, for the most part, at the Rocky Mountain Herbarium at the University of Wyoming, Laramie, Wyoming. Mr. Goodding writes me: "While I was stationed at the Dyer Mine I was limited in my explorations to 'Shanks ponies.' On leaving I made some collections on the trip north to Wyoming, but I did not get very far south of the Dyer Mine." H. D. Langille also reached the Uinta Mountains in 1902. His specimens are in the U. S. National Herbarium.

Presumably in 1903, L. H. Pammel went up Black's Fork on the north slope of the Uinta Mountains. He published (Pammel 1903) an account of the trip with notes on altitudinal distribution. Pammel spent six seasons in the Uinta Mountains and in 1900 and 1908 reached their south slopes, or the Uinta Basin proper, collecting grasses primarily. According to his map (Pammel 1913), during his travels in this region he went into (or back from) the Uinta Mountains from Piedmont and Evanston, Wyoming, and Park City, Utah. On the north side he went up Bear River to north of La Motte Peak and to the same place from Piedmont. From west of Kamas he went around the north slope just west of Watson Peak, north of La Motte, Wilson, and Gilbert Peaks and over the range across Taylor Mountain (probably) to Vernal, Whiterocks, up Strawberry River and so to Kamas.

Mr. O. A. Peterson and Mr. Earl Douglass, members of early Carnegie Museum paleontological field parties to the Uinta Basin, collected plant specimens, cited in the present paper, during the years 1908 and 1912, particularly in the vicinity of the Dinosaur National Monument. Their specimens are now in the Carnegie Museum Herbarium.

Dr. Francis W. Pennell, in 1915, went around the Uinta Basin, collecting at such points as Rawlins, Green River, and Evanston, Wyoming, through Salt Lake City, Soldier Summit, and Castlegate, Utah, to Grand Junction, Colorado, and eastward (see Pennell, 1920). Miss Alice Eastwood and others have also collected just south of the Basin. Prof. A. O. Garrett of Salt Lake City has collected extensively in western Utah, but writes that he has made "for a day or two at a time, only three visits to the Uintas." Dr. P. A. Rydberg

collected with Prof. Garrett in southern Utah but they did not reach the Uinta Basin. Dr. Aven Nelson and his students have collected in the vicinity of the Basin, especially to the north. George E. Osterhout reached the Uinta Basin in 1922 and 1925, collecting in both the Utah and Colorado sections of the Basin.

Among the other botanists who have visited the region within the last two decades are: Dr. E. B. and Mrs. Payson; Dr. Walter P. Cottam; Dr. George J. Goodman and Dr. C. L. Hitchcock, who have collected especially on the north slopes of the Uinta Mountains; Dr. J. M. and Mr. M. T. Greenman; Dr. Louis Williams; Dr. Seville Flowers, who is particularly interested in bryophytes; Mr. Bassett Maguire; Prof. Bertrand Harrison; Dr. Frederick J. Hermann; Mr. Rufus D. Johnson, who is interested in living Penstemons; Ruth Dowell Svihla, who worked on the mammals of the north slope of the Uintas in relation to vegetation and topography; and Dr. Margaret T. Doutt (Mrs. J. K.) who assisted her husband in field mammalogy in the Uinta Basin for the Carnegie Museum during 1933 and 1936. Specimens of many of these collectors, cited in the present paper, are now in the Carnegie Museum Herbarium. Collections have also been made by members of the U. S. Forest Service in the Ashley, Uinta, and Wasatch National Forests, each of which touches the Uinta Basin; their specimens at the U. S. Forest Service Herbarium at Washington, D. C., have been consulted and certain of them cited in the present work.

CARNEGIE MUSEUM BOTANICAL EXPEDITIONS

The collections of the Carnegie Museum botanical expeditions upon which the present work is largely based were made during the summers of 1931, 1933, and 1935. Each year the personnel of the expeditions consisted of the writer and Mrs. Graham. Travel throughout the Basin was accomplished by automobile, augmented by hiking and pack trips into the less accessible places, such as the summits of the Uinta Mountains, the rim of the Tavaputs Plateau, and the deeper Green River canyons. Collections were made as early as April 24 (1933) and as late as September 11 (1935), thus covering the seasons from the earliest vernal conditions to late fall.

During 1931 the Basin was visited in early summer and again in early autumn, on the way to and from the scene of other botanical

activities in the Pacific Northwest. We entered the Basin by crossing the Uinta Mountains south of Green River, Wyoming, over the Vernal-Manila road. We left it in July over highway US 40 to Salt Lake City and in August re-entered the Basin over this same highway. In September we finally left the Basin by going east on US 40 by way of Craig, Colorado. The first visit in 1931 was from June 17 to July 9, when collections were made along the Green River near Quarry "L," in the vicinity of Vernal, and along West Fork (of Lake Fork) Creek. Upon returning to the Basin in the fall, we visited the same localities, excluding those on West Fork, and spent from August 28 to September 22 in the Basin with the exception of the period from September 9 to 17, which was spent in a trip to and from the Grand Canyon of northern Arizona through southwestern Utah. In the "Summary of Collecting Data" and "Description of Major Collecting Localities" given on pages 83 and 92 respectively, the 1931 collections are shown to include 15 localities (Nos. 1-15 inclusive) and 807 numbers.

During 1933 the time from April 22 to July 28 was spent continuously in the Uinta Basin and its environs. Collections were made for the most part on the south slopes of the Uinta Mountains and the central Basin desert areas south of Jensen and south of Myton. We entered the Basin over US 40 from the west because the roads entering the Basin from the east and north were still blocked with snow. One collection was made in Jackson Draw on the north side of the eastern Uintas and another in Pine Canyon on the south side of the Book Cliffs. A reconnaissance trip was also made around the outer limits of the Basin from Vernal to Wellington over the Vernal-Price road to Grand Junction to Rifle to Meeker to Craig, from where we re-entered the Basin over US 40. We finally left the Basin in July by way of US 40 going west, collecting in and near Cedar Breaks on July 28 and 29 on our way home. The 1933 collections include 39 major localities (Nos. 16-54 inclusive, plus 56 in part) as well as certain other localities which were revisited, and embrace 1132 numbers.

During 1935 the time from April 30 to September 13 was spent continuously in the Uinta Basin and its environs. We entered the Basin in April over highway US 40 from Denver and finally left it in September on the same highway going west. During the summer further reconnaissance trips were made outside the Basin so that a circle was nearly completed around the area, only a small sector to

the northeast being uncovered. The summer was spent in visiting representative areas throughout the Tavaputs Plateau, the extreme eastern and western ends of the Basin, and a few additional places in the center and in the high Uintas not visited in the two previous seasons. The 1935 collections include 35 major localities (Nos. 55-89 inclusive) as well as certain others which were revisited, and embrace 1532 numbers.

The collecting seasons of 1931 and 1933 were both exceptionally dry, while that of 1935 was, in contrast, an unusually favorable year for the development of the native plants.

The Graham collections made during the three Carnegie Museum botanical expeditions to the Uinta Basin in 1931, 1933, and 1935 therefore cover 89 major collecting localities and embrace 3471 field numbers.

PHYSIOGRAPHY

GEOGRAPHIC DEFINITION OF THE UINTA BASIN

The Uinta Basin is a natural depression lying in northeastern Utah and northwestern Colorado. On the north, the Basin is limited by the high crest of the Uinta Mountain range. This boundary merges westward into the divide at the headwaters of the Duchesne River, and in the extreme west end of the Basin includes the area drained by the Strawberry River, a portion of which is now covered by the large artificial lake, Strawberry Reservoir. The entire southern boundary of the Basin is defined by the southern edge of the Tavaputs Plateau, which breaks off into the Brown Cliffs,[2] both west and east of the Green River, thus including the sources of all the

[2]Powell (1875 p. 53) having observed them on his first canyon voyage, once called those cliffs at the mouth of Gray Canyon the "Azure Cliffs." Later (1879 p. 98), following Gunnison, who observed them from the south, Powell referred to them as the "Book Cliffs." This latter name has been more or less consistently used by subsequent authors. Powell likewise called those cliffs which are north of the Book Cliffs, and at the mouth of Desolation Canyon, the "Brown Cliffs," designated by certain subsequent writers as the "Roan Cliffs," both these names being now used synonymously on U. S. G. S. topographic maps. However, the name "Book Cliffs" has sometimes been confusingly applied, especially by natives, to this latter northernmost set of cliffs, which, correctly, should be called the Brown Cliffs. They form the crest of the Tavaputs Plateau and the southern rim of the Uinta Basin as here treated. The true Book Cliffs of Gunnison and Powell therefore lie south of the Basin.

streams flowing northward into the Strawberry, Duchesne and White Rivers as far east as Piceance Creek, most of which is included. West of the Green River this southern boundary parallels Range Creek, which is excluded from the Basin. The extreme eastern end of the Basin is the only place in which the boundary is not strictly defined by drainage, although it must be remembered that the Green River bisects the entire Basin, without destroying the natural unity of the depression. In the east we arbitrarily consider the Basin to be limited by the ridge west of Government and Sheep Creeks, Colorado and, northward, by the Gray Hills west of Strawberry Creek, Colorado. While this limitation excludes the upper White River and its tributaries, such a limit seems topographically justified. By certain floristic distinctions also, this boundary is the apparent transition area between the desert conditions of the Basin to the west and the more mesophytic conditions of the Rocky Mountain foothills to the east. From its eastern limit, including the westward drainage of the Citadel Plateau, the boundary of the Basin swings westward into the divide at the head of the south-flowing tributaries of White River. The Grand Hogback and Danforth Hills therefore lie just outside the Basin to the east. Thence the divide stretches westward into the natural axis of the Uinta Mountains, thus completing the delimitation of the Uinta Basin. (See map, Plate XIII).

The area of the Basin is approximately 12,000 square miles; it is roughly oval in outline, its long dimension of some 150 miles extending in an east-west direction, and its greatest north-south expanse across the central portion being about 100 miles. It is entirely encompassed within the latitudes of 39° and 41° N. and the meridians of 108° and 111° 30′ W. The elevation of the low central portion is about 4500 feet above sea level, although the Green River cuts several hundred feet lower where it cleaves the Tavaputs Plateau. The Basin boundary seldom drops below 8000 feet, notably only on the northeast rim where a pass at 6500 feet is utilized by highway US 40. The Green River, of course, enters and leaves the Basin by way of channels much lower, but through such deep canyons that it cannot be said to affect the general conformity of the depression. The White River also enters the Basin by way of a valley through the Basin's east rim. The Tavaputs Plateau rises to 10,000 feet, the Uinta Mountains to 13,500 feet; while the west rim falls slightly below 8000 feet.

Although it differs in certain details, the geo-topographic boundary of the Basin as it is here delimited conforms very well with the Uinta Basin as it is defined by geologists and, to a lesser extent, by certain physiographers. Baker (1935 p. 1486), in considering the southern boundary of the Uinta Basin, defines the area as "a regional downwarp occupying a large part of northeastern Utah. Its approximate boundaries are the Book Cliffs on the south, the Utah-Colorado State line on the east, the Uinta Mountains on the north, and the Wasatch Range on the west. . . It extends westward from Colorado River at the Utah-Colorado State line in a great arc convex toward the south. In the vicinity of Green River the trend of the basinward dipping rocks swings northward along the east flank of the San Rafael Swell; the trend continues northward for about 40 miles and then swings due west to . . . a few miles northwest of Price."

Fenneman (1931 p. 277) considers this area to be the northernmost part of the Colorado Plateaus Province. He describes it as an area "along the northern border [of the Province] and abutting against the Uinta Mountains on the north. It consists of north-dipping beds limited on the south by a great escarpment. The higher southern margin is called *The Tavaputs Plateaus*. The whole section is known as the *Unita Basin*, most of its interior portion being lower than the edges both structurally and topographically."

Our delimitation of the Uinta Basin agrees closely with Fenneman, except in the southeast. Fenneman (1931 p. 305) states that "the Colorado River crosses this section [Uinta Basin] near its eastern end cutting off an area some 40 miles in diameter in which are preserved fragments of a lofty lava cap forming Grand Mesa and Battlement Mesa. North and west of the Colorado, there is also an area of similar size called the Book Plateau, which is almost detached from the main body. Both these areas are dissected by radial streams leaving relatively narrow patches of uncut plateau between headwaters."

From our viewpoint, the Grand and Battlement Mesas, south of the Colorado, are entirely outside of the Basin, while none of that part of the Book Plateau draining southward into the Colorado is included, this area being treated in this paper as the outward southeast flank of the Basin rim. Fenneman's physiographic Uinta Basin Section corresponds closely with the extension of the Eocene Lake Uinta of Bradley (1929 p. 88; 1936 p. 421). Bradley, however, on the basis

of geologic structure, divides this total area into (1) the Uinta Basin, west of an anticlinal axis extending south from Rangley, Colorado, roughly along Douglas Creek, and (2) the Piceance Creek Basin east of that axis. Differing both from Fenneman's physiographic delimitations and from Bradley's unity of geological structure, we are drawing the southeastern boundary of the Basin, largely on topographic grounds, to exclude this southeastern lobe.

PROFILE OF THE BASIN

The topographic profiles of Plate I show to what extent the Uinta Basin is a true depression, encircled by an elevated rim. Profile A-B represents a north-south line from the highest part of the Uinta Mountains at Mt. Emmons, 13,455 ft., (exceeded in altitude only by King's Peak, 13,498 ft., some five miles to the northwest) to Bruin Point, 10,285 feet, the highest point in the Brown Cliffs. This profile, which is west of the Green River, shows the relation of the true Book Cliffs to the higher Roan or Brown Cliffs, which latter form the actual topographic rim of the Basin. (See also map, Plate XIII).

The Profile C-D is parallel to, and east of, Profile A-B and transects the Basin at its greatest north-south extension. The same distinct basin-like cross section is shown here as farther west in Profile A-B where the rims are higher and closer together. It will be noted that the south rim on this profile, which is east of the Green River, is still the Brown Cliffs, while the Book Cliffs here become lower in elevation and begin to lose their identity.

Profile E-F transects the Basin at its greatest east-west extension, from the divide west of Strawberry River at the reservoir lake, eastward to the Gray Hills. The depressed center of the Basin is evident in this east-west direction as well as from north to south, although the east and west rims are not as high as those of the north and south boundaries. Raven Ridge, shown just east of the Utah-Colorado state line in this profile, actually affects the unity of the depression much less than may seem apparent in this profile, as it practically disappears by the time it reaches White River. The relation of the Gray Hills to the higher Danforth Hills is shown in this profile. The gradual rise of the land eastward into the Rocky Mountains makes necessary some arbitrary boundary here and the Gray Hills serve very well as such an eastern Basin rim (See also p. 25).

GEOLOGY

The Uinta Basin as a great structural depression stretches from pre-Cambrian rocks in the high Uintas to deposits of Tertiary age in the center of the Basin and the crests of the south rim in the Brown Cliffs (see Plate I). King (1878 p. 9) early defined the Uinta Mountain range as "an immense single mountain block, about 150 miles long, having an average elevation of 10,000 to 11,000 feet, and rising at its culminating point, Emmon's Peak, to 13,694[3] feet. It is defined, both on the north and on the south, by Tertiary tablelands, which abut unconformably against its steeply inclined strata. As a range it is unlike any other in America, being in fact a great, lofty plateau of nearly horizontal strata, which at the north and south edges are sharply broken and thrown into highly inclined positions. The physical and geological section, therefore, is of a great flat anticlinal, having a plateau summit thirty or forty miles wide. . ."

The axis of the Uinta fold is not in the center of the range, but nearer its northern margin, the beds lying almost flat along the broad top of the fold, but near the margins they break away at angles of 45° or more (see Weeks 1907). The Uintas differ from the Rocky Mountains in not having crystalline igneous rocks exposed as a central axial mass. In fact, throughout the Uinta Basin, there is in general a conspicuous absence of igneous rocks or signs of volcanic activity. The topmost areas of the Uinta range are composed of what is now considered pre-Cambrian quartzite, earlier described as Uinta sandstone. Its age and composition have been variously interpreted, as no fossils have been found and it varies from dark red sandstones in the east to purplish-red quartzites in the west.

Weeks (1907) maps the broad central pre-Cambrian summit to be bordered by narrow bands of Cambrian (Lodore) shale with these, in turn, especially on the south flank, overlapped by a thin layer of an Ordovician (Ogden) quartzite. Farther down the southern flank of the range, but higher stratigraphically, there is a somewhat broader band of Mississippian quartzites and limestones, white to gray or greenish in color. Certain streams such as Brush and Ashley Creeks disappear into dissolved channels in this soluble limestone, to emerge

[3]The bench mark on top of Mt. Emmons in 1933 read 13,455 feet. King's Peaks, five miles to the northwest, are now considered the highest in the Uintas; the topographic maps give the elevation of the higher southern one as 13,498 feet.

several miles farther down the mountain side. Conformably upon the Mississippian lie the Pennsylvanian rocks which in their turn are overlain by Permian beds, the latter forming a discontinuous belt near the foot of the range. Phosphate of commercial importance is found in the Permian beds. White (1889 p. 688) calls attention to the fact that these Paleozoic strata, from the pre-Cambrian summit of the Uintas down through the Permian beds, "consist as a whole of much harder rocks than those of the later formations."

Of these later formations the oldest are the Triassic, resting conformably upon the Permian. These Triassic beds consist of white, buff, and reddish sandstones and shales, at places brick-red in color and commonly referred to as "red beds," intercalated with clays and shales. They are in many places nearly covered with Tertiary beds and glacial moraines. Also much covered, Jurassic limestones, sandstones and shales rest upon the Triassic beds. Among the lower Jurassic formations is the aeolian White Cliff sandstone, which forms magnificent perpendicular walls along Dry Fork and other streams. It is in rocks of the uppermost Jurassic age (see Gilmore 1936 p. 184) that the rich beds of dinosaur remains are found at the quarry originally worked by the Carnegie Museum and established as a National Monument. Upon these rest the Cretaceous sandstones, conglomerates and shales, some of which are of marine origin. Cretaceous coal occurs in the Book Cliffs and in the south slopes of the Uintas. All of these Mesozoic and the lower Paleozoic beds are stacked at highly inclined angles against each other, the lowermost resting against the central pre-Cambrian quartzite. This arrangement is largely due to the powerful tectonic disturbance which raised the great Uinta anticline at the close of Cretaceous time. As it rose, its flanks became degraded, the material removed going into the production of the extensive Tertiary formations.

These Tertiary formations now spread from the base of the Uintas over the entire central part of the Basin southward into the summits of the Brown Cliffs. The thick Eocene Green River formation, including great oil shale reserves, outcrop slightly north of White River in the eastern end of the Basin (see Kay 1934) but emerge south of the White and Strawberry Rivers to cover the entire surface of the southern half of the Basin, including its southern rim in the Brown or Roan Cliffs (see Woolley 1930 p. 60). At the base of these cliffs, still older Eocene Wasatch beds outcrop. Above the Green River formation

lie the Eocene Uinta beds, paralleling the long axis of the Basin and exposed for some miles north of the Green River outcrops. Peterson (1895) has divided these Uinta strata into Horizons "A," "B," and "C," in ascending order, Horizon "A" resting upon the Green River formation (see also Peterson and Kay 1931). Upon these Eocene Uinta beds and north of them, flanking the base of the Uinta range, where in their central portion they unconformably contact the more steeply inclined Mesozoic and Paleozoic strata, are the lower Oligocene Duchesne River beds subdivided by Kay (1934) into the Randlett, Halfway, and Lapoint Horizons, named in ascending order. Part of this Oligocene material is conglomerate which it is very difficult to distinguish from glacial drift. It is in the Tertiary rocks that the Uinta Basin's important commercial quantities of gilsonite are found.

That the diastrophic movement of the Uinta Basin area did not stop after the major Cretaceous uplift, is shown in the tilting of the later Tertiary beds. Powell (1875 pp. 152-153) says of the Green River's cutting through the Uinta Mountains: "The river had the right of way; in other words, it was running ere the mountains were formed; not before the rocks of which the mountains are composed, were deposited, but before the formations were folded, so as to make a mountain range . . . as the fold was lifted, it [the river] cleared away the construction by cutting a cañon, and the walls were thus elevated on either side . . . the river was the saw which cut the mountains in two." Forrester (mss.) states that "a major uplift of the Uinta range occurred in the late Eocene or early Oligocene time" accompanied by large scale faulting, and that in late Tertiary or early Quaternary time there was another uplift, "shown by a marked entrenchment of the meandering Green, Yampa and other master rivers of the region. It is now generally accepted that the Green River and its tributaries are later in their development than the first Uinta uplift." Recent fault slips in the area show tectonic action still to be in progress (see Peterson and Kay 1931 p. 298).

The last geological force to importantly modify the topography of the region was the Pleistocene glaciation, which greatly modified the contours of the Uinta Mountains. Other parts of the Basin were not affected. Atwood (1909 p. 12) states that "evidences of at least two epochs of glaciation appear in the region . . . the earlier . . . presumably the longer, for the ice of that epoch was thicker and extended

farther down the canyons than the ice of the later epoch. . . On the south slope [of the Uintas] the lower limits [of the ice] during the earlier and later epochs are approximately 7,000 and 8,000 feet respectively." He continues (loc. cit. p. 65): "At the period of the maximum extension of ice, glaciers covered by far the greater portion of the Uinta Mountains west of longitude 109° 40′ and a few extended beyond the mountains into the lower country north and south. . . The total area covered by ice was somewhat over 1,000 square miles. The portions of the range that rose above the ice near the crest line were lofty peaks and narrow, rugged divides. On the flanks of the range the areas not covered by ice lay between the great canyons. . . Most of the catchment areas in which glaciers were formed are 10,000 feet or more above the sea. A few favorably located basins, between 9,000 and 10,000 feet, furnished ice. The lower glacier basins are all near the west end of the range, where the snow fall was presumably greatest. . . The longest glacier was 27.5 miles long, the shortest independent glacier was 1.5 miles long." The south slope of the Uintas was more heavily glaciated than the north, in spite of more intense insolation, due probably to its more gentle slope and broader catchment basins. Since glacial time there has been remarkably little weathering and erosion, except in certain inner gorges where it is supposed that there might have been a slight post-glacial uplift. The streams are still engaged in moving the little disintegrated morainic material which was largely contributed by the hard quartzites of the mountain top. There are over 500 glacial lakes in the Uintas, many in chains due to blocking by recessional moraines.

It was at first thought that it might be possible to correlate the altitudinal distribution of vegetation in the Basin with the underlying geological formations, especially along the south slopes of the Uintas, where both formations and vegetation occur in parallel series. Such correlations have been made, for instance, by Cuyler (1931) who worked on an area around Austin, Texas. However, in the Uinta Basin there seems to be no such direct correlation, the limits of many zones, such as the distinct Juniper-Pinyon Zone, holding strictly to its altitudinal limits in spite of variation in the underlying geological formations. It would seem that wherever geological formations are composed solely of a certain type of rock, such as sandstone, shale, clay, etc., then the soil derived from such a formation may definitely

affect its plant cover, and there may be a resultant correlation between geological formation and vegetation. For instance, wherever the Green River formation consists of shales, as it does throughout much of the Basin, certain plants are found and there, in fact, endemic species have developed. On the other hand, where the Green River formation consists of massive sandstones, shale plants do not occur and the flora may be similar to that of other sandstone areas. Where environmental factors such as rainfall, temperature, length of growing season, etc. begin to vary with difference in elevation, the geological formation, even though composed of a homogeneous soil, has still less influence upon the vegetative cover.

CLIMATE

There is available for the Uinta Basin none of those detailed climatic data which are of critical importance to plants, such as careful evaporation measurements and their relation to precipitation, duration and intensity of temperature conditions, soil temperatures, moisture-temperature relations, relative humidity, and so on. The present discussion of climate is derived from standard United States Weather Bureau Summaries for Sections 21 and 22 up to 1930 inclusive and is intended only to give some conception of the general climatic factors of the region. Even the Weather Bureau stations in the area are confined to low and mid-altitudes, and we can only surmise what the upper altitude conditions really are.

For the Mixed Desert Shrub Zone, which is represented by four stations (see Table 1), the climate, according to Köppen's classification, is a BSk climate, that is, a dry, semi-arid climate with rainfall evenly distributed throughout the year and an average annual temperature below 64.4° F. Of the two stations representing the Juniper-Pinyon Zone, the lowermost, at Watson, shows a climate very close to that of the Mixed Desert Shrub Zone stations, but nevertheless different enough that, combined with the other station of the Juniper-Pinyon Zone, at Fruitland, the average data of the two stations show the climate of the Juniper-Pinyon Zone to be of the sub-humid Dfb type in which the rainfall is greater than in the BSk type, the temperature of the coldest month is below 26.6° F., and the temperature of the warmest month is above 50° F. with no dry season and a cool summer, that is, with the temperature of the warmest month under

71.6° F., but at least four months above 50° F. The single remaining station considered, at the junction of the Sub-montane Shrub and Aspen Zones, at East Portal, shows a Dfc climate, similar to the Dfb, but differing in having a cool, short summer, with only one to three (actually only one) months above 50° F. It is to be regretted that climatic data are not available for the Lodgepole Pine, Spruce-Fir and Alpine Zones, for the close correlation between general climatic types and altitudinal vegetation zones in the Uinta Basin, as shown by the low and mid-altitude records, is rather striking.

In the upper zones the snowfall may be heavy, and indeed it may cover the lower altitudes throughout the coldest months of an extreme winter. On the level at Paradise Park, at 10,000 ft., according to U. S. Forest Service men, the snow was seven feet deep April 7, 1932. The snowfall is usually over in June, to begin again in September. Snow usually remains in sheltered spots throughout the summer in the Uinta Mountains, although there is no perpetual snow line. The cattle season at Paradise Park is considered from June 20th to August 20th, after which the grass is browned by frost. On June 18, 1931, the ice broke in the Chain Lakes, which are about 10,700 feet in altitude. Although snow does not lie there throughout the summer, we were told that on the Tavaputs Plateau, at Willow Springs, the snow was four feet deep June 1, 1935, and that it usually snows there again in September.

Certain general climatic features, not given below in the detailed discussion of precipitation, temperature and frost, are of interest. For instance, at Fort Duchesne, Duchesne and Watson there is an annual average for the three stations of 206 clear days, 94 partly cloudy days, and 65 cloudy days. The wind at Fruitland is dominantly from the southwest, at Myton from the west and at Watson from the south. The wind seems to be from the southwest in the Uinta Mountains, as evidenced by storms experienced at Mirror Lake, fire-scars on trees at Moon Lake, and by the slant of trees near timber line above the Chain Lakes.

Sampson (1918) has shown that in the Wasatch Mountains the average monthly temperature is highest in the sagebrush and lowest in the spruce-fir zone and that the average annual rainfall decreases in the spruce-fir zone after reaching a maximum in the aspen zone. Likewise he shows evaporation to be greatest in the lowest zones and least in the aspen-fir zone, with intermediate records in the spruce-

fir zone. Sunshine was about the same in all zones with wind movement about twice as great in the spruce-fir as in the aspen-fir zone. Cottam (1927) has also recorded evaporation rates on Mt. Timpanogos, in the Wasatch Mountains. Robbins (1910) states that in Colorado there is an increase of precipitation to the summit of the mountains and that there is no zone of maximum precipitation above which there is a decrease. As the Uinta Basin differs in certain other respects from the Wasatch Mountains to the west and the Colorado Rockies to the east, further studies of environmental conditions relating to the higher Uinta Basin zones will be of considerable interest.

PRECIPITATION

In order to make the available precipitation data of most significance, there has been chosen a period of years as nearly uniform as possible for the stations cited, namely the 20-year period from 1910 to 1930 inclusive, the years covered being noted (see Table 1). The annual average and the summer, April to September, average are charted. It will be noted that for the stations in the Mixed Desert Shrub and the Juniper-Pinyon Zones the rainfall is nearly equally distributed between the winter and summer months. In the single station for the mid-altitude region the winter rainfall has increased to about 60 per cent of the annual total but this percentage is still less than the 70 per cent considered necessary by the Köppen classification to make the region one of primarily winter rainfall. Throughout all of the zones represented the precipitation is therefore considered to be evenly distributed throughout the year. Although about one-half of the annual rainfall occurs in the summer months of April to September, inclusive, the wettest of the summer months is September, when as much as one-fourth of the total summer precipitation may occur. Consequently even less of the total summer rainfall is available for plants in the spring growing season than might be inferred from the figures given. The driest month of the year varies greatly, June usually taking first place, but some of the winter months often being the driest of the year.

TABLE 1. PRECIPITATION IN INCHES

Also correlation of the seven U. S. Weather Bureau stations used throughout the present discussion of climate with the altitudinal vegetation zones recognized in the present work.

	Vegetation Zone	Station	Altitude of Station in feet above sea level	Period of years covered by precipitation data	Average Annual	Average April to September inclusive
Upper Altitude	Alpine Zone	none				
	Spruce-Fir Zone	none				
	Lodgepole Pine Zone	none				
Mid Altitude	Aspen Zone	none				
	Sub-montane Shrub Zone	East Portal*	7606	1912–1927	21.04	8.41
Low Altitude	Juniper-Pinyon Zone	Fruitland	7000	1911–1929 Except 1917-1919 incl.	12.49	6.25
		Watson	6210	1912–1930	11.87	7.20
	Mixed Desert Shrub Zone	Duchesne	5528	1910–1930	9.52	5.47
		Vernal	5266	1910–1930 Except 1914-1919 incl.	8.60	4.18
		Myton	5030	1916–1930	7.30	4.68
		Fort Duchesne	4941	1910–1930	6.60	3.69

*East Portal is at the junction of the Sub-montane Shrub and Aspen Zones.

TABLE 2. TEMPERATURES IN DEGREES FAHRENHEIT

(For correlation of stations with vegetation zones see Table 1.)

Station	Length of record (years)	Average Annual	Average Jan.	Average July	Average Maximum		Average Minimum		Absolute Maximum		Absolute Minimum	
					Jan.	July	Jan.	July	Jan.	July	Jan.	July
East Portal	14	34.9	11.3	58.1	26.1	74.8	−3.6	41.4	55	87	−50	24
Fruitland	16	42.1	21.0	64.3	33.8	80.2	8.2	47.7	54	95	−27	28
Watson	20	46.2	20.5	71.7	31.9	86.7	9.1	56.7	60	99	−23	31
Duchesne	25	43.6	15.6	68.3	29.6	85.8	1.5	50.8	54	98	−34	35
Vernal	28	45.0	17.4	70.3	29.1	88.2	4.9	52.1	56	102	−29	25
Myton	13	46.1	14.4	72.3	27.8	89.5	.7	55.0	52	100	−27	32
Fort Duchesne	40	44.2	12.6	70.6	26.7	89.7	−.5	51.3	59	101	−34	31

TEMPERATURE

The accompanying temperature data (see Table 2), like the other climatic data, relate only to the lower Mixed Desert Shrub and Juniper-Pinyon Zones and the lowermost Aspen Zone where it meets the Sub-montane Shrub Zone, the upper altitude zones being unrepresented. In addition to excluding the uppermost zones, the temperature data are not given over a consistent period of years, largely because extremes were desired instead of averages. The period of years covered is noted, and the annual average is given. The January average and the July average are given as representing respectively the average coldest and warmest months. Absolute maxima and minima are given, for while they may have been reached only a few times, or perhaps only once during the period of years recorded, they are possibly of as much significance in relation to plants as any other temperature factors. If high temperatures, especially when associated with drought, persist over a critical period in the growth of a species, individuals of that species may be seriously damaged, and if those high temperatures should be repeated at such a critical time during two or three successive years, the species may disappear from the region, even though such a series of conditions may occur but once in a long time. The same is true of extremely cold periods during a single or during successive winters. Shreve (1914 p. 201) studied the relation of winter temperatures to the vertical distribution of vegetation in Arizona and found that "the greatest number of consecutive hours of freezing temperature is the factor most closely corresponding, in its distribution, with the limitation of the species concerned." While January and July are charted because they usually show the greatest extremes, in many of the localities cited December and February temperatures have dropped a few degrees below the January minimum. For example, the all-time minimum of −36° F. at Fort Duchesne was reached in February, while similar minima of −29° F. at Myton and −39° F. at Duchesne were reached in December. Likewise May, June and August sometimes send the temperature higher than any of the July records. At Vernal the maximum temperature of 106° F. has been recorded in May and June. While the existence of certain species may be closely related to absolute extremes of temperature, the vegetation as a whole may be more nearly an expression of the average maxima and minima, and these

TABLE 3. FROST DATA

(For correlation of stations with vegetation zones see Table 1.)

Station	Length of Record (years)	Average date of last killing frost in spring	Average date of first killing frost in autumn	Average number of frost-free days—Growing season	Latest date of killing frost in spring	Earliest date of killing frost in autumn	Shortest number of frost-free days*
East Portal	16	July 5	Aug. 26	52	July 29	Aug. 1	2
Fruitland	14	June 12	Sept. 17	97	July 3	Sept. 5	64
Watson	20	May 23	Sept. 25	125	July 3	Sept. 3	62
Duchesne	25	June 1	Sept. 15	106	June 24	Aug. 25	62
Vernal	30	May 26	Sept. 21	118	July 4	Sept. 4	62
Myton	13	May 20	Oct. 1	134	July 3	Sept. 11	70
Fort Duchesne	32	May 29	Sept. 19	113	July 2	Sept. 2	62

*For available data on longest number of frost-free days see text.

averages have been included in the Table. The temperature data show the Uinta Basin to be a region of distinctly continental climate, with great extremes of temperature, even within a single altitudinal zone, as shown by both the average and absolute extremes. In general it may be said that the highest temperatures are reached in the Mixed Desert Shrub Zone and the lowest in the uppermost zones, as intimated by the East Portal records. However, in the upper forested areas, where the total precipitation is very probably greater, the temperature is not believed to be proportionately lower in winter, although it certainly is never so warm in summer as the lower zones.

Shreve (1914 p. 200) found the fall in temperature with increase in altitude in the Santa Catalina Mountains of Arizona to be 3.46° F. per 1000 feet, which he says is identical with that for Pike's Peak. On this basis one might calculate, from the annual average temperature of 44.2° F. at Fort Duchesne at approximately 5000 feet, that the annual average at East Portal at approximately 7500 feet, might read 35.4° F. It is reported as 34.9° F., which shows the fall in temperature with increase in altitude in the Uinta Basin to agree closely with that of the Santa Catalinas and Pike's Peak. On this basis, the annual average temperature in the Uinta Mountains at tree line, 11,000 feet, might be calculated to be 23° F.

FROST

Table 3 gives certain more or less significant frost data for the important Uinta Basin stations. Like the temperature data, the period of years covered is not uniform, as extremes are believed more important than averages. The number of years covered is listed, however. The average number of frost-free days for the four Mixed Desert Shrub Zone stations listed is 118, and the average shortest number for the same stations is 64. Although detailed data are not available for the four stations, data reported from Vernal show the longest frost-free period to have occurred from April 22 to October 19, a total of 180 days, in the year 1897. Likewise for Duchesne, the longest frost-free period was from May 6 to September 20, a total of 137 days, in the year 1913. The average frost-free period for the two Juniper-Pinyon Zone stations given is 111 days. At the lone mid-altitude station the average frost-free period has dropped to 52 days.

ALTITUDINAL VEGETATION ZONES

PREVIOUS TREATMENT OF SURROUNDING REGIONS

Francis Ramaley (1907) early outlined the altitudinal vegetation zones of the Rocky Mountains of Colorado into the following groups: Plains or Grassland up to 5800 ft.; Foothill from 5800 to 8000 ft., including *Pinus scopulorum* and *Sabina* (*Juniperus*) *scopulorum;* Montane, from 8000 to 10,000 ft., mostly Lodgepole Pine; Sub-alpine from 10,000 to 11,500 ft., including Engelmann's Spruce and Alpine Fir; and Alpine above 11,500 ft. (See Table 4).

Marcus E. Jones (1910) was the first to formulate a classification of the altitudinal zones of vegetation for that geographic area of which Utah is now a part. Although he did not publish it until 1910, Jones states that he had developed his classification much earlier, the body of his 1910 paper having been written in 1895 and later elaborated. He states (loc. cit. p. 53) that he had previously published its substance in the "Western Galaxy" in 1883. Using Humboldt's terms, Jones divided the vegetation into two major zones: (1) the Arid Tropical, in southwestern Utah around St. George, now popularly known as "Utah's Dixie," and (2) the Temperate. The Temperate Zone he subdivided into (a) Lower Temperate, including the Juniper and Sagebrush areas; (b) Middle Temperate, including the deciduous oak and Yellow Pine areas; (c) Upper Temperate, including the Spruce-Fir areas to tree line; and the (d) Frigid or Arctic-alpine zone, including the sub-alpine treeless regions of high altitudes. He did not attempt to give the altitudinal limits of these zones in feet above sea level.

W. W. Robbins (1910), using Ramaley's classification of altitudinal vegetation zones in the Colorado Rockies, discussed these zones in relation to Colorado climate throughout the state.

Per Axel Rydberg (1913 et. seq.), in his "Phytogeographical Notes on the Rocky Mountain Region," divided the upper vegetation zones of the Rockies into Montane, Sub-alpine and Alpine belts, with considerable discussion of plant formations and communities and lists of species involved, together with other notes and interpretations. Later (1922) in the introduction to the second edition of his "Flora of the Rocky Mountains and Adjacent Plains" he gives the following zones and their altitudinal limits as referable to Colorado: Upper Sonoran, including upper desert and Pinyon-Cedar, 4500-6000 ft.;

or surrounding regions.

	Sampson 1925 Utah and Nevada	Cottam 1929 and 1933 Utah	Svihla 1932 North Slope of Uinta Mountains	Dixon 1935 High Plateaus of Utah
	Arctic-Alpine	Alpine Grassland	Alpine	Alpine Meadow Alpine Scrub
	Spruce-Fir	Spruce-Fir	Spruce-Fir	Sub-alpine Forest
		Spruce-Fir	Pine	Montane
	Aspen-Fir	Aspen		Pinus ponderosa
	Yellow Pine and Oak Brush	Scrub Oak Western Yellow Pine	Sagebrush	
	Pinyon-Juniper	Pigmy Forest	(Cedar-Pinyon)	Pinyon
t ıb		Northern Desert Shrub Salt Desert Shrub		Northern Semi-Desert Northern Desert Alkali Association
		Salt Desert Shrub Southern Desert Shrub		Southern Desert

TABLE 4. ALTITUDINAL VEGETATION ZONES

Correlation of the zones recognized in this work with those recognized by previous authors for surrounding regions.

Graham (Present Treatment)	Merriam 1898 Western United States	Ramaley 1907 Colorado Rocky Mountains	Jones 1910 Great Plateau	Clements 1920 Western North America	Rydberg 1922 Rocky Mountains	Tidestrom 1925 Utah and Nevada	Shantz 1925 Utah and Nevada	Sampson 1925 Utah and Nevada	Cottam 1929 and 1933 Utah	Svihla 1932 North Slope of Uinta Mountains	Dixon 1935 High Plateaus of Utah
Alpine	Arctic-Alpine	Alpine	Frigid	Alpine Meadow	Alpine	Alpine	Alpine Grassland	Arctic-Alpine	Alpine Grassland	Alpine	Alpine Meadow Alpine Scrub
Spruce-Fir	Hudsonian	Sub-alpine	Upper Temperate	Sub-alpine Forest	Sub-alpine	Sub-alpine Spruce	Spruce-Fir Forest	Spruce-Fir	Spruce-Fir	Spruce-Fir	Sub-alpine Forest
Lodgepole Pine	Canadian	Montane	Middle Temperate	Montane Forest	Montane				Spruce-Fir	Pine	Montane
Aspen						Aspen		Aspen-Fir	Aspen		Pinus ponderosa
Sub-montane Shrub	Transition	Foothill		Chaparral	Sub-montane	Yellow Pine	Western Yellow Pine	Yellow Pine and Oak Brush	Scrub Oak Western Yellow Pine	Sagebrush	
Juniper-Pinyon	Upper Sonoran		Lower Temperate	Woodland	Upper Sonoran	Pinyon	Pinyon-Juniper	Pinyon-Juniper	Pigmy Forest	(Cedar-Pinyon)	Pinyon
Mixed Desert Shrub		Plains		Sagebrush		Artemisia	Northern Desert Shrub Salt Desert Shrub		Northern Desert Shrub Salt Desert Shrub		Northern Semi-Desert Northern Desert Alkali Association
	Lower Sonoran		Arid Tropical		Lower Sonoran	Covillea	Southern Desert Shrub		Salt Desert Shrub Southern Desert Shrub		Southern Desert

Sub-montane or Foothills 6000-8000 ft.; Montane or Pine 8000-10,000 ft.; Sub-alpine or Spruce 10,000-11,500 ft.; and Alpine above tree line 11,500-14,400 ft. He also mentions Lower Sonoran zone for the Colorado River canyon and the Virgin River valley in southern Utah.

In the introduction to his "Flora of Utah and Nevada," and in the notes on the distribution of species listed, Ivar Tidestrom (1925) gives the following eight zones in ascending altitudinal order: Covillea (*Covillea tridentata*) zone below 3000 ft.; Artemisia (*Artemisia tridentata*) and Pinyon (*Pinus monophylla*) zones from 3000 to 7000 ft.; Yellow Pine (*Pinus ponderosa* and *P. brachyptera*) zone, 7000 to 9000 ft.; Aspen and Spruce Zones, 9000 to 11,000 ft.; Sub-alpine Zone; and Alpine Zone. Only on his map does he correlate the zones with the altitude, but the relative altitudinal positions of his zones are shown in Table 4. Tidestrom, like Jones before him, treated a large geographical area and the altitudinal positions of their zones necessarily vary with latitude. In the introduction to Tidestrom's "Flora," H. L. Shantz, under the heading "Plant Communities in Utah and Nevada" (loc. cit. p. 15), divides the vegetation into altitudinal and latitudinal zones, namely Southern Desert Shrub or Creosote Bush (Covillea); Salt Desert Shrub or Greasewood; Northern Desert Shrub or Sagebrush; Pinyon-Juniper woodland; Western Yellow Pine forest; Spruce-Fir forest; and Alpine Grassland. In this classification the Salt Desert Shrub is not strictly an altitudinal zone but rather an edaphic community of saline or alkaline soils which occurs largely within the limits of the Northern Desert Shrub zone. Shantz elaborates upon the desert zones, treating a number of component plant associations in each, giving moisture and soil preferences, but not elevational limits. Shantz's discussion is followed (loc. cit. p. 24) by a treatment of "The Foothill-Montane-Alpine Flora and its Environment" by Arthur W. Sampson based largely upon his work in the Wasatch Mountains (Sampson 1918). He discusses the higher zones and divides them as follows with their respective altitudes: Pinyon-Juniper 5000-6500 ft.; Yellow Pine and Oak Brush 6200-7600 ft.; Aspen-Fir 7400-9500 ft.; Spruce-Fir 9000-11,000 ft.; and Arctic-Alpine above timber line. He discusses each zone and gives characteristic species as well as general remarks on the climatic factors involved.

In 1929, W. P. Cottam published a note and a table of vegetation

belts in Utah with their altitudinal limits and their correlation with "temperature zones," apparently Merriam's Life Zones. No explanatory notes accompany the names of the belts, which are: Southern Desert Shrub 1800-3500 ft.; Salt Desert Shrub 1800-3500 ft.; Northern Desert Shrub 3500-5000 ft.; Pigmy Forest (Juniper, Pinyon, Mahogany) 4000-7000 ft.; Western Yellow Pine 5500-8000 ft.; Scrub Oak 5000-7500 ft.; Aspen 7000-8500 ft.; Spruce-Fir (Blue Spruce, White Balsam, Douglas Fir) 7000-8500 ft.; Spruce-Fir (Engelmann's Spruce and Black Balsam) 8000-10,000 ft.; and Alpine Grass Land 10,000 ft. and above. In a later article Cottam (1933) elaborates upon these same zones and intimates by his descriptions (no scientific names being given) that the White Balsam is *Abies concolor* and the Black Balsam is *Abies lasiocarpa*. In this article he gives the Salt Desert Shrub as existing in both the Upper and Lower Sonoran zones, although he previously (1929) gave it the same altitudinal limits as the Southern Desert Shrub (Lower Sonoran).

Ruth Dowell Svihla (1932), in a paper on the distribution of mammals on the north slope of the Uinta Mountains, treats a specific area which is closer to the Uinta Basin proper than any other considered up to the present time. She divides the vegetation into the following belts: Sagebrush 5800-9000 ft.; Cedar-Pinyon minor belt 7000-8000 ft.; Pine (Yellow and Lodgepole Pines) 8000-10,500 ft.; Spruce-Fir 10,500-11,700 ft.; and Alpine 11,700-11,900 ft., including meadow and krumholz. She places timber line at 11,700 ft. The Sagebrush and Cedar-Pinyon zones are grouped into a Plains Zone, and the three other higher zones into a Mountain Slope Zone. In this paper the author gives an interesting discussion of ecological concepts in relation to her work in the Uintas.

Helen N. Dixon (1935) in botanical studies of the high plateaus of south-central Utah, gives the following more or less altitudinal zones: Southern Desert, Pinyon or Southern Semidesert, Alkali Association or Greasewood, etc., Northern Desert or Sagebrush, and Northern Semidesert of Cedar and Mountain Mahogany. All of these xerophytic communities exist below 7500 ft., with the Cedar and Pinyon sometimes pushing up to 9000 ft. Above these she distinguishes the *Pinus ponderosa* climax 7500-9000 ft.; the Montane zone of Aspen and Douglas Fir 8700-9500 ft.; Sub-alpine forest of Engelmann's Spruce and Sub-alpine Fir 9500-11,000 ft.; and Alpine Meadows and Alpine Scrub above the last stated altitude. Con-

siderable ecological discussion, with a list of species tabulated in relation to zones, is included in this paper.

Recently Hanna (1934) has treated the plant communities of the region at the headwaters of the Little Laramie River in southeastern Wyoming, and others have published scattered notes on the vegetation of limited areas in the central Rocky Mountain and intermontane regions.

In order to better correlate the terminology of the altitudinal vegetation zones of previous authors with that recognized in the present work, Table 4 has been constructed. In addition to the treatments mentioned above, two others, by Merriam (1898) and by Clements (1920), which cover western North America as a whole, have been added to the table.

UINTA BASIN ZONES

Throughout the following discussion of the altitudinal vegetation zones of the Uinta Basin, it must not be presumed that the limits of such zones are as exact and unquestionably defined as shown in Fig. 1. The figure and the following discussion deal with altitudes

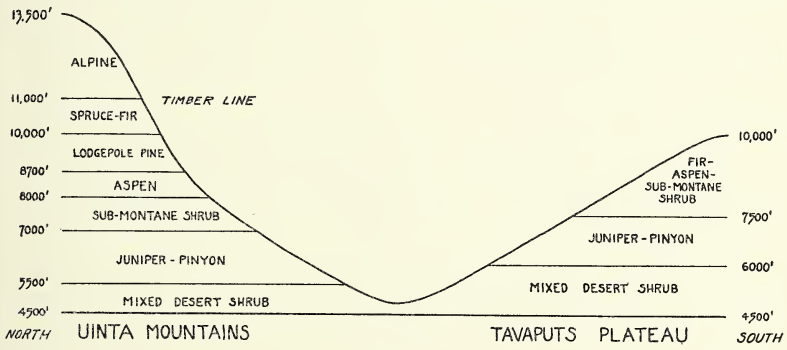


FIG. 1. Diagrammatic Representation of the Altitudinal Vegetation Zones in the Uinta Basin.

which represent averages for the limits of the zones, based upon observation. Elevations were determined in the field by reference to topographic quadrangles, and where maps were not available elevations were determined by the use of an anaeroid barometer. The barometer was checked as frequently as possible with bench

marks, the data for which, in many instances unpublished, were kindly furnished by the United States Coast and Geodetic Survey.

Although distinct altitudinal belts of vegetation exist in the Uinta Basin, where zones contact each other the vegetation characteristic of the two zones may dovetail or even mix. Cottam (1930) called attention to this mixing of zones when he stated that "some of the best examples of zone jumbling to be found in Utah are furnished by this region" (Uinta Mountains). He cites a locality on the Beaver Creek about ten miles east of Kamas, which is outside the northwest rim of the Uinta Basin at the west end of the Uinta range. Here, he says, representatives of Upper Sonoran, Transition, Canadian, Hudsonian, and Alpine zones all occur at approximately the same elevation and at close proximity. He lists 21 species of woody plants indicating the same type of mixture which we found near Moon Lake at apparently the same altitude (see p. 55 below). Within the Uinta Basin, however, such mixtures are but exceptions to the generalized altitudinal zonation. In fact, throughout arid and semi-arid regions, as Shreve (1916 p. 58) has pointed out for the isolated desert mountains of southern Arizona, "the great bulk of the species are physically controlled in their distribution, as is abundantly shown by the universality of each of these species throughout a given altitudinal range or a given set of habitats, and by the definiteness with which it is limited by rather sharply drawn lines."

In the present paper we have attempted to describe both altitudinal zones and plant communities without detailed reference to comparable latitudinal or other spatial zones or to ecological successional history, but simply to characterize them as they exist at present in the area under consideration. In this procedure we agree with such students of environment as Allee (1926 pp. 484-486), who, in his study of animal communities on Mt. Logan, which is east of Logan, Utah, in the northern Wasatch Mountains, calls attention to the existence of Sagebrush above the Hudsonian Spruce-Fir zone where tundra is expected. He says that "obviously something has gone wrong with the indicators. The temperature relations here, almost ten thousand feet above sea level are decidedly different from those of the valley, as is shown by the mid-summer snow banks and the spring beauties and other vernal flowers blooming here long after they are past in the valley. The critically minded field naturalist

with ecological training is likely to wonder if it would not be more scientific to describe these regions as Sagebrush, Aspen, or Engelmann's Spruce associations rather than to generalize them into the so-called life zones with their implied relationships between these mountain belts and the latitudinal belts of the eastern part of the continent. Further, one can but marvel at the potency of an idea in diverting attention from apparent facts when he considers the obvious correlation between moisture and plant and animal distribution in this region and the decidedly less obvious temperature relations. Yet the latter was chosen as the original basis of the life zone concept."

It is interesting to note how the hydrogen-ion concentration of the soil varies with altitude in the Uinta Basin vegetation zones. A number of pH readings were taken by colorimetric methods in representative spots of each of the altitudinal zones. Although only approximate results can thus be obtained, there was shown to be a progression of hydrogen-ion concentration from the lower to the uppermost zones. The low altitude Mixed Desert Shrub and Juniper-Pinyon Zones have soil with a pH value of about 7.5 or above; the mid-altitude Sub-montane Shrub and Aspen Zones record a pH of 6.5 to 7; and the upper altitude Lodgepole Pine, Spruce-Fir, and Alpine Zones often show a pH of 6 or slightly less. So the soil changes from the strongly alkaline lower zones through the neutral mid-altitude regions to the slightly acid conditions of the upper altitudes. We have previously called attention to this fact elsewhere (see Graham 1937b and Henry 1936). Throughout the Basin, even in the forested zones, the soil is shallow and the accumulation of humus is nowhere great.

A discussion of the altitudinal vegetation zones of the Uinta Basin follows.

MIXED DESERT SHRUB ZONE (See Plate II, Fig. 1.)

The Green River, where it trenches the Tavaputs Plateau, is at an altitude of about 4300 ft., but the general elevation of the open, lowermost center of the Basin is only slightly less than 4500 feet. Reaching upward from this central low elevation to 5500 or 6000 feet and fingering further upward along the saline flood-plains of the streamways, there exists a rather complex mixture of plant associa-

tions.[4] Everywhere this mixture is dominated by woody perennials of various forms, and we are grouping this spatial arrangement of like plant associations into the altitudinally limited Mixed Desert Shrub Zone. The associations involved agree in general with those of the Salt Desert Shrub (in part) and the Northern Desert Shrub of previous authors. However, since the halophytic associations of the Basin are fewer and less extensive than in certain regions to the south and west, and since none of the associations within the Basin is considered indicative of true Lower Sonoran conditions, the term here proposed for this zone seems advisable, especially since it is used in an altitudinal sense. Most of the genera treated by Shantz (1925) as characterizing associations of strongly alkaline areas, such as those near Great Salt Lake (his Salt Desert Shrub), namely Allenrolfea, Salicornia, Dondia, and Sporobolus, do not form associations within the Basin, although the genera Dondia and Sporobolus are represented there. None of Shantz's Southern Desert Shrub associations are found within the Basin, nor on its outward slopes. On the south slope of the Uinta Mountains our Mixed Desert Shrub Zone scarcely exceeds an elevation of 5500 feet, except in local areas, but on the flatter, more open Tavaputs Plateau in the southern half of the Basin, it extends to 6000 feet or above, before the immediately higher Juniper-Pinyon Zone becomes pronounced.

The Mixed Desert Shrub Zone consists primarily of seven plant associations, described more fully elsewhere (see p. 65). They are: (1) Sarcobatus Association; (2) Mat Atriplex Association; (3) Kochia-Hilaria Association; (4) Chrysothamnus Association; (5) Atriplex-Tetradymia Association; (6) Low Altitude Artemisia Association; and (7) Eurotia Association. There are also certain other elements in the vegetational pattern of this zone which, together with the associations, are discussed more fully under "Plant Communities" (see p. 59).

JUNIPER-PINYON ZONE (See Plate II, Fig. 2.)

Within the approximate altitudes of 5500 to 7000 feet on the south slope of the Uinta Mountains and 6000 to perhaps 7500

[4]Throughout this work the term "association" is used in a broad, generalized sense to designate a plant community with an apparently distinct floristic composition, at least of dominant plants, and is therefore a "phenotypic" unit; it is not intended to indicate any particular type of restricted ecological concept.

feet on the Tavaputs Plateau, there is a well defined belt of xerophytic evergreen woodland of which *Juniperus utahensis* is the dominant species. The Pinyon, *Pinus edulis*, is a component of secondary importance, and, in places, such as north of Vernal, almost lacking. In other places, as in the east end of the Basin at the head of Deep Channel Creek, Colorado, at an elevation of 6000 feet, the Juniper and Pinyon are about equally abundant. Such an equal distribution of the two trees also occurs in certain parts of the Tavaputs Plateau and at the west end of the Basin. When it is observed from a great distance this zone seems to form a dark, solid belt, but it is in reality a stand of scattered, low trees rarely exceeding 20 feet in height, with their branches seldom touching. Occasionally on rocky benches, as southeast of Jensen and along Douglas Creek, low, scattered stunted trees will appear below the usual lower limit of the zone, although this is rare. In other places, on the other hand, as on broad ridges along the Vernal-Manila road north of Vernal, Junipers fall short of reaching their average lowermost limits by several hundred feet. Along streams, where the normal altitudinal arrangement of zones is inversed (see p. 54), Juniper-Pinyon woodland often occurs lower than usual, for example at 5600 feet along Hill Creek, and 5000 feet at Dragon, both localities being in canyons of the Tavaputs Plateau, where the Juniper-Pinyon Zone is usually well developed only above 6000 feet.

SUB-MONTANE SHRUB ZONE (See Plate III, Fig. 1.)

Immediately above the Juniper-Pinyon Zone, on the south slope of the Uinta Mountains, approximately between 7000 and 8000 ft., is a belt of low, deciduous, bushy shrubs belonging to the genera Artemisia, Amelanchier, Cercocarpus, Symphoricarpos, Purshia, etc. The shrubs are often so close together that one can walk among them only with difficulty. They are usually not more than three feet in height, although species of Amelanchier may be conspicuously several times the height of the prevailing forms. Sub-montane Shrub has the appearance of chaparral, which, in fact, Clements (1920 p. 183) called a similar belt to the south and east of the Basin. Throughout Clements's Petran, or Rocky Mountain chaparral, however, Artemisia is not a dominant plant. In contrast to Californian or Coastal chaparral, this Uinta Basin shrub zone is composed largely of de-

ciduous and non-sclerophyllus species. In the Uinta Basin various species of Artemisia are responsible for the appearance of this zone, and in the presence of Artemisia this zone shows a direct relation with the uppermost parts of the Mixed Desert Shrub Zone where *Artemisia tridentata* often occurs. Consequently it is believed preferable to designate this belt as the Sub-montane Shrub Zone, instead of chaparral, using Rydberg's term "sub-montane," to indicate altitudinal position, and the life-form expression "shrub" to denote the relationship with the Mixed Desert Shrub Zone below. The Sub-montane Shrub Zone is, on the south slopes of the Uintas at least, an intermediate zone between the more xerophytic Juniper-Pinyon and Mixed Desert Shrub Zones below, and the more mesophytic forested zones above. It is considered Transition in the sense of Merriam while the two lower zones are both Upper Sonoran (see Table 4). This zone may extend in patches above 8000 feet in the Uinta Mountains, especially on dry ridges, and it may sometimes extend below its prevailing lower limit of 7000 feet, especially in canyons.

On the Tavaputs Plateau the plants of this zone are not often in competition with forests, and in such areas the Sub-montane Shrub stretches upward to the very summits of the Plateau where it alternates with patches of Aspen, or, in the canyons, gives way to forests of Alpine Fir. Consequently, from the upper limits of the Juniper-Pinyon Zone to the crest of the Brown Cliffs at 10,000 feet, there is an altitudinal zonal mixture which does not occur in the Uinta Mountains, although its components exist there. We have designated this mixture the Fir-Aspen-Sub-montane Shrub Zone (see Plate III, Fig. 2). Along the streams this complex may extend fairly low, as it does along the north-facing slope of the south fork of Minnie Maud Creek along the Price-Vernal road at an elevation of 6700 feet, or along Douglas Creek at 6900 feet. Its usual altitudinal range is from 7500 feet, the upper limit of the Juniper-Pinyon Zone, to the summit of the Plateau.

In treating other parts of Utah and Colorado, previous authors have mentioned certain tree species as dominants in altitudinal zones comparable to our Sub-montane Shrub Zone. Examples are the Yellow Pine, Oak, Douglas Fir, and Blue Spruce. While these trees are found within the Uinta Basin, none of them here forms a distinct zone. It may be well to discuss the occurrence of these trees in the Uinta Basin, however, and such discussion follows.

Within the Uinta Basin the Yellow Pine (*Pinus scopulorum*) is associated with the Sub-montane Shrub Zone, but it is largely confined to the larger river canyons as shown by stands of fine large trees along Uinta River in Big Park and along Lake Fork Creek below Moon Lake. Above 8000 feet the canyons of the major streams draining the south slopes of the Uinta Mountains become narrower and it is in the broader, more open areas immediately below this that the Yellow Pine occurs, usually on flood-plains and lateral moraines of glacial material of an early epoch (Atwood 1909 map). Yellow Pine is not confined to glacial soils, however, as it occurs on the unglaciated Tavaputs Plateau, although it is not abundant there. North of Vernal, Yellow Pines occur in canyons as low as 6800 feet, but this is unusual. On the Tavaputs Plateau, Yellow Pine was observed at the head of Post Canyon (a western tributary of Hill Creek) at about 8200 feet, where a few large specimens stand among the surrounding Aspens. A few fallen, charred trunks indicated that these few trees might be the remnants of a more extensive stand which had once spread throughout surrounding areas now covered with Aspen. This hypothesis is further strengthened if one agrees that the present Aspen Zone everywhere is the result of changes due to fire. It does not seem to us, however, that this is universally true (see p. 51). On the Tavaputs Plateau, Yellow Pine also occurs in lateral canyons off Green River, as in Florence Canyon, as well as in the upper tributaries of Hill Creek.

In discussing the plant geography of north-central New Mexico, J. R. Watson (1912 p. 215) states that "in watching the Sandia Mountains during four winters I have been struck by the very close correlation between the lower limit of the average winter heavy snow and that of the lower limit of the Yellow Pine. I believe that it is chiefly these snows that determine the distribution of this tree." Whether this is true in the Uinta Mountains we have not been able to determine, but it is an interesting point.

The distribution of Quercus in the Uinta Basin is very interesting. It is almost possible to define the limits of the Basin on the west, south and east by this genus, for the oaks enter the Basin only near its periphery, encroaching through low places in the Basin's rim. They enter only a short distance down a valley, soon becoming dwarfed in size and disappearing. Perhaps because the latitude of the Uinta Basin roughly marks the northern limit of the genus

throughout the intermontane region, we found no oaks on either the north or south slopes of the Uinta Mountains, except at the west end of the range. However, a reliable native, who has lived many years in Vernal, in 1936 reported to a member of a Carnegie Museum field party that he had recently discovered a small patch of oaks in Ashley Creek canyon. On the slopes of Red Creek valley, scattered among other Sub-montane shrubs, there are several patches of oaks at 7500 feet. Also in the west end of the Basin, and at the same altitude, there are oaks at the mouth of the West Fork of Duchesne River, while dwarfed, isolated trees come down to an altitude of 6500 feet west of Fruitland. We also observed them at 6200 feet along Red Creek just above its entrance into Strawberry River. This locality, less than twenty miles from the Basin rim, is the farthest penetration of the oaks into the Basin which we have noted. In the southern part of the Basin, oaks have been observed along Horse Corn (Fortification) Creek at 6800 feet, Baxter Pass on the Basin rim at 8300 feet, Post Canyon at 7800 feet, Douglas Creek at 6600 feet, and on the plateau above Dragon at 7500 feet. They were also found in the bottom of Florence and Chandler Canyons at 6000 feet. None of these localities is very many miles from the crest of the Brown Cliffs, the Basin's rim. In the east end of the Basin, oaks occur near the head of Stuart Creek at 7600 feet, a small patch about three feet high was found at 6400 feet among Junipers near the head of Deep Channel Creek with a few taller trees east of there at 6700 feet, and a number of fair sized trees was observed in Powell Park along the White River about ten miles west of Meeker, Colorado. The oaks are considered a part of the Sub-montane Shrub Zone and their occurrence at elevations below the lower limit of that zone is due to their habit of following down the streams. The fact that the oaks are so nearly excluded from the Basin is the more interesting when one realizes that on the Basin's outward slopes they form dense, solid stands which cover large areas. This is true west of the Basin, as near Heber, south of it, as along Soldier Creek north of Wellington, and east of it, as in the vicinity of Rio Blanco, Colorado.

Douglas Fir (*Pseudotsuga mucronata*), while not confined to altitudes of the Sub-montane Shrub Zone, is probably most common in canyons at those altitudes. In the Uinta Mountains, although nowhere abundant, it is probably the most ubiquitous tree species, for it exists at 5300 feet at Island Park, and at 10,300 feet in spruce

forest west of Paradise Park. In the west end of the Basin it occurs along upper Red Creek. On the Tavaputs Plateau it is frequently scattered among Aspens. It grows with Aspens at Mud Springs at 8800 feet and along Douglas Creek at 7600 feet, while in Post Canyon at 8000 feet it is found with Aspen and a few Yellow Pine. At Baxter Pass, Colorado, at 8500 feet, on the crest of the Brown Cliffs, it occurs in such quantity that it was cut for the ties of the Uintah Railroad, the only railroad to enter the Uinta Basin. At the east end of the Basin it was observed along Piceance Creek at 7000 feet and on the Basin rim north of Deep Channel Creek at about 7800 feet.

Blue Spruce (*Picea pungens*) is nowhere common in the Basin. In the Uinta Mountains it was collected at 7300 feet in Whiterocks Canyon and at 8500 feet near Brush Creek. It was also observed at Moon Lake and Dyer Mine and in the west end of the Basin it occurs in the moist bottom of Red Creek valley at 7500 feet. In the southern part of the Basin it was observed in Indian Canyon and was collected at 7800 feet near the head of Bitter Creek. Cones were found in lower Cottonwood Canyon, washed down from the rim north of Sunnyside.

It is interesting to note that the White Fir or White Balsam (*Abies concolor*) has not been collected in the Basin.

ASPEN ZONE (See Plate IV, Fig. 2.)

On the south slope of the Uintas, from 8000 to 8700 feet, or occasionally lower, as in the west end of the Basin at Horse Creek, there is a more or less uniform zone of Aspens (*Populus aurea*). Within these altitudinal limits representatives of other zones sometimes appear, as in exposed, warm, dry areas where the Sub-montane Shrub extends upward, or in the cool, moist canyons where certain upper altitude species occur. On the Tavaputs Plateau patches of Aspen have been observed along Douglas Creek as low as 7000 feet and along Stuart Creek at 7500 feet, but Aspens are not extensive there below 8000 feet. On the Tavaputs Plateau they never form a more or less unbroken transverse zone as they tend to do in the Uintas, even at the summit of the Plateau, where they alternate in patches with Sagebrush and other members of the Sub-montane Shrub Zone. The Aspen is found in burned-over areas in higher zones, especially in the Lodgepole Pine belt, and a solitary dwarfed, gnarled specimen a foot

high was collected at tree line above Brown Duck Lake. While Aspen as well as Lodgepole is believed to invade burns in the Spruce-Fir Zone also, it probably does not do so at highest altitudes, for an area of spruce timber burned in 1902 at 10,700 feet north of Chepeta Lake was, in 1935, quite bare of any invading tree species. Neither does the Aspen invariably invade burns in the Lodgepole Pine Zone, for a burn in Lodgepole Pine south of Paradise Park is densely covered with sixty-year-old cone-bearing Lodgepoles, which, because of their great numbers and crowded condition, are only 6 to 8 feet high. While Lodgepole Pine populates burns in the Northern Rockies and Aspen invades similar areas in the Southern Rockies, in the Uinta Mountains both trees seem to be equally successful in this respect. However, it is difficult to believe that these trees owe their distribution here to the population of burned-over areas, for they are so widespread in the Uintas and occur there within such nicely delimited altitudinal zones that they must have formed a part of the primeval vegetational pattern of the region.

Throughout the present work the dynamic aspect of the ecology of the region has been given little attention, as that, together with the phytogeography of the area and other problems not considered here may be subsequently treated. Concerning the invasion of burns by Aspen and Lodgepole Pine and associated successions, however, considerable has been written, including pertinent papers by Clements (1910), Cottam (1930), and Pearson (1914).

LODGEPOLE PINE ZONE (See Plate V, Fig. 1.)

From 9000 to 10,000 feet there is in the Uinta Mountains a heavily forested belt of *Pinus Murrayana* which covers many hundreds of square miles. Its upper limit is not exact, for the Lodgepole merges gradually into the Spruce-Fir Zone, where, as near Queant Lake in the Uintas, Lodgepole may be co-dominant with Engelmann's Spruce at 10,600 feet. Lodgepole Pine may also occur lower than 9000 feet, and sometimes scattered trees will be found among the upper Aspens. In the peculiar vicinity of Moon Lake, Lodgepole is found at 8200 feet with other higher altitude trees. It often invades burns in the Spruce-Fir Zone. We have been unable to locate Lodgepole Pine on the Tavaputs Plateau.

In the Lodgepole Pine and other upper forested zones there is not

usually much "down-timber." Wind-falls are apparently rare and the chief cause of fallen trees seems to be the poor anchorage of roots in a shallow soil. We heard trees falling at Paradise Park on a comparatively still night after it had been raining steadily for two days and the soil was well soaked. In one place where we did observe a number of fallen old Lodgepole Pine, their barkless, weathered trunks showed spiral twisting as in a right-hand thread.

SPRUCE-FIR ZONE (See Plate V, Fig. 2.)

From about 10,000 feet to tree line at 11,000 feet in the Uinta Mountains there is a forest dominated by *Picea Engelmanni*, with *Abies lasiocarpa* as a secondary species. The Alpine Fir is in many parts of this zone almost absent. While Engelmann's Spruce is probably never found below 9000 feet, even in cold canyons, the Alpine Fir is often found at much lower altitudes. In the Uinta Mountains Alpine Fir is found at Moon Lake at 8200 feet, and in the west end of the Basin, along Horse Creek, it comes in on north-facing slopes with Aspen at 7700 feet. It occurs at Wolf Creek Pass with Engelmann's Spruce at 9400 feet, and on the Tavaputs Plateau is mixed with Douglas Fir and Aspen at Mud Springs at 9000 feet. It occurs on the steep, north-facing slopes of east-west streams entering the Green River, such as Rock Creek, in pure stands at 9300 feet. We did not observe it in the east end of the Basin. No Engelmann's Spruce has been found on the Tavaputs Plateau.

Throughout this zone in the Uinta Mountains, and, to a lesser extent in the Lodgepole Pine Zone too, there are a great number of glacial lakes and open meadow areas. In many cases the meadows indicate the existence of former lakes now filled with vegetation; in other cases they probably indicate burns which have not become repopulated with forest, or, in some cases, are probably natural open areas due to peculiar edaphic or local climatic conditions. The Tavaputs Plateau, being unglaciated, possesses no such lakes and no such grassy meadows.

ALPINE ZONE (See Plate VI, Fig. 1.)

This zone exists only in the high Uinta Mountains and extends from tree line, at an altitude of approximately 11,000 feet, to the summits of such peaks as King's Peaks and Mt. Emmons, which lack

only a few feet of reaching an elevation of 13,500 feet. It is largely an area of small meadow patches between expanses of broken, jumbled, lichen-covered quartzite, or, in a few places, grassy borders of alpine streams and lakes. More extensive patches of alpine meadow exist near the tree line where they sometimes dovetail with the upper outposts of the Spruce-Fir forest.

INVERSION OF ZONES

The usual zonal inversion, where upper zones reach downward in cool, moist canyons, and lower zones extend upward on the dry, warm ridges, does not always occur. For instance, in the open draws of streams, where they enter the Mixed Desert Shrub Zone, there is not the usual inversion of altitudinal zones. In such stream draws the associations of the Mixed Desert Shrub Zone extend far above the elevations they otherwise occupy, a phenomenon one would expect on the warmer, better drained slopes between the streams, but not in the draws themselves. For example, in the valley of Douglas Creek, Greasewood extends to 6500 feet, where it then gradually gives place to Sagebrush, and, in Smith Wells Draw, Eurotia thrives at 6300 feet. Both Greasewood and Eurotia are otherwise confined to the Mixed Desert Shrub Zone below 5500 or 6000 feet. Perhaps moisture and cold air drainage from above are here dissipated, and the more alkaline condition of the flood-plain soils is the most important and determining factor.

On the other hand, at Island Park, along the Green River, for instance, where cold air drainage from the slopes above is undoubtedly more significant, Juniper is well developed at less than 5000 feet. Indeed, here at the base of the high, northwest-facing cliff-like escarpment of Blue Mountain, several large Douglas Firs grow in a protected notch at 5300 feet.

In Desolation Canyon, at the mouth of Florence Canyon at 4300 feet, Junipers and Pinyons are also well developed on the rocky canyon sides. Such a low occurrence of these trees is a good example of that zonal inversion usually found in canyons, probably the expression of a local climate due not only to temperature differences, which result from cold air drainage from above coupled with less total sunlight received, but also to moisture differences, due to longer retention of snow in spring and less dessication during the summer as a result of less sunlight and less exposure to dry winds.

Perhaps the greatest inversion of altitudinal zones in the Uinta Basin is shown within the limits of the Aspen Zone. The canyons here are cut deep into the upturned Paleozoic strata which flank the Uinta Mountains, and along Brush Creek at 8500 feet Lodgepole Pine was collected. The greatest mixture of upper and lower zone trees which we have noted is near Moon Lake at 8200 feet. Here occur *Populus aurea*, *Cercocarpus montanus*, *C. ledifolius*, *Juniperus scopulorum*, *J. sibirica*, *J. utahensis*, *Pseudotsuga mucronata*, *Pinus edulis*, *P. flexilis*, *P. scopulorum*, *P. Murrayana*, *Abies lasiocarpa*, *Picea pungens*, and *P. Engelmanni*. The most striking example of true inversion, however, occurs near the rim of the Tavaputs Plateau where, at 10,000 feet, the broad, open plateau is covered with Sagebrush and other Sub-montane Shrub species while, within a stone's throw, the deep narrow canyons are filled with Aspen, Douglas Fir and Alpine Fir, the latter in solid stands on the north-facing slopes.

UINTA MOUNTAIN AND TAVAPUTS PLATEAU ZONES COMPARED

Before the region was visited, it was thought that the altitudinal zones of vegetation on the Tavaputs Plateau might occupy relatively lower elevations than those on the south slope of the Uinta Mountains, due to the northern exposure of the Tavaputs Plateau. This, however, did not prove to be the case. A glance at the diagram (Fig. 1) shows that the lowermost zone, the Mixed Desert Shrub Zone, reaches some 500 feet higher on the north-facing Tavaputs Plateau than it does on the south-facing slope of the Uinta Mountains. Such a difference is likewise true of the uppermost limits of the Juniper-Pinyon Zone, and above this elevation the mixture of Fir, Aspen, and Sub-montane Shrub carries members of these zones to far greater altitudes on the Tavaputs Plateau than they occupy on the south face of the Uintas.

The explanation for this fact very probably rests with the altitude reached by the two areas. In the Uinta Mountains the greater altitude means greater precipitation, and during the winter there is a great accumulation of snow which, in normal seasons, never completely melts from protected spots. This results in low temperature and considerable moisture, even in the summer, due to melting snowbanks. On the Tavaputs Plateau snow never remains throughout the summer,

although patches of oak or aspen in protected depressions and stands of Alpine Fir on north-facing canyon slopes indicate where the snow tarries late into the summer. The southern Plateau, however, does not reach an altitude sufficient to provide a year-round source of moisture, and the streams draining it northward are consequently intermittent and of an arid type as compared with the full-flowing major streams of the south slope of the Uinta Mountains. So on the Tavaputs Plateau at 10,000 feet there may be extensive patches of Sagebrush (*Artemisia tridentata*), while at the same altitude in the Uintas there usually occur dense forests of Lodgepole Pine or Englemann's Spruce, interrupted only by verdant meadows of a truly alpine character or by small glacial lakes which are entirely absent on the Plateau to the south.

Water run-off is also probably greater on the Tavaputs Plateau than in the Uinta Mountains, although its slope is not so steep as the Uinta Mountains, because of the lack of vegetation and humus cover and because of the more horizontal position of the underlying geological strata. On the Plateau there are many exposed ridges and knolls of flaky shale outcrops which are practically devoid of vegetation. In the Uinta Mountains the upturned strata tend to hold water in their joints and cracks and here also soil tends to develop. All of the upper Uinta strata are harder and more impervious than those of the Tavaputs Plateau, and in many places springs come to the surface after flowing underground between impervious layers.

One might suppose that the latitudinal position of the north and south rims of the Basin would be of significance, since the Tavaputs Plateau is about 100 miles south of the Uinta Mountains. This seems to be of comparatively little significance, however, when one recalls (see Shreve 1915) that in the Santa Catalina Mountains of southern Arizona, more than 500 miles south of the Uinta Basin, in a range which scarcely exceeds 9000 feet in elevation, there are, on the north slope, dense forests of *Pseudotsuga mucronata*, *Abies concolor*, and *Pinus strobiformis*. With an impression of this forest in mind it is somewhat surprising to find that 500 miles to the north, on a north-facing slope more than 1000 feet higher, one finds so much open shrub-land and so few coniferous trees.

Unfortunately there are no climatic data for the Tavaputs Plateau country. However, it is not likely that insolation plays an important role in the differences noted between the Plateau and the Uintas, nor

that wind is a deciding factor as it is shown to be by Blumer (1910) in the Rincon Mountains of Arizona. While there may be some difference in temperature, it seems logical to conclude that in the Uinta Basin, as in other arid lands, the factor most important in the distribution of altitudinal zones of vegetation is moisture, and that more moisture is available on the south slopes of the Uinta Mountains, due fundamentally to their greater elevation, than on the lower Tavaputs Plateau to the south.

OUTER BASIN SLOPES

While the present work is concerned primarily with the plants within the Uinta Basin, it is interesting to note in passing the vegetation on the outward slopes of the Basin. Svihla (1932) has discussed the vegetation zones on the north slope of the Uinta Mountains from the Sagebrush desert of the flats north of the range to the summit, in a transect southwest of Manila. Her Sagebrush or Plains Zone covers an altitudinal expanse comparable to our Mixed Desert Shrub, Juniper-Pinyon, and Sub-montane Shrub Zones combined, with the upper limit of her Sagebrush Zone coinciding with the upper limit of our Sub-montane Shrub Zone (see Table 4). She gives a "minor belt" of Juniper and Pinyon within the Sagebrush Zone, near the latter's upper limits. Our own limited observations confirm her statement that the Juniper is less abundant and occurs at a higher elevation on the north slope than we have shown it to occupy on the south. Somewhat lower and farther away from the base of the range to the northeast of where Svihla worked, there are also associations representative of what we call Mixed Desert Shrub. Her Pine belt includes Yellow Pine and Lodgepole and corresponds to the altitudes included in our Aspen and Lodgepole Pine Zones, but on the north slope Yellow Pine is a much more common tree than on the south. Her Spruce-Fir and Alpine Zones correspond fairly well with ours except that she places tree line at 11,700 feet. That timber line should be several hundred feet higher on the north slope of the Uinta Mountains than it is on the south slope seems indeed strange, and although we have only been as high as the Lodgepole forest and have not observed timber line on the north slope, a vegetation map of the Ashley National Forest in the U. S. Forest Service office at Vernal, Utah, shows the timber line to be approximately the same on both sides of the Uintas. In general it is probably correct to say that

roughly the same vegetation zones occur on the north slope of the Uinta Mountains as on the south, except that on the north slope they are not so distinctly delimited, and may in places be much more mixed.

One might expect considerable canting of the vegetation zones between the north and south slopes of an east-west range such as the Uinta Mountains, similar to that shown by Shreve (1915 p. 12) for the Santa Catalina Mountains of Arizona. Such, however, does not seem to be the case, at least not consistently. Along Smith's Fork on the north slope of the Uinta Mountains the Junipers first appear at a much higher elevation, and the Sagebrush, as an open association, extends upward farther than on the south slope. On the other hand, Lodgepole Pine on the north side occurs in solid stands at 8400 feet, which is lower than usual on the south slope. At Green Lake on the north slope Aspen and Lodgepole occur as low as 7600 feet just above extensive stands of Yellow Pine. Further observations of this phenomenon in the Uintas would be of interest.

West of the Basin are the outskirts of the Wasatch Mountains, foothills whose summits are from 7000 to 9000 feet in elevation. They are drained by Provo River and other streams flowing westward into Utah Lake, the streams cutting through the Wasatch range. Near the divide, or crest of the Basin, there are Aspens with some Douglas Fir, Alpine Fir, and an occasional Engelmann's Spruce at such high passes as Wolf Creek Pass on the northwest rim, or a few Lodgepole Pines as in upper Daniel's Canyon. The coniferous trees give way, below, to Aspen, Oak and to Sub-montane Shrub of Sagebrush, Amelanchier and Cercocarpus. *Cercocarpus ledifolius* is fairly common on canyon slopes west of the Basin with Blue Spruce along the upper, and Narrow-leaved Cottonwood along the lower stream bottoms. Big-leaved Maple is also more common than in the Basin. Between the Wasatch Range and the rim of the Basin, the vegetation is primarily a mixture of upper Sub-montane Shrub and upper altitude forest trees, without any definitely apparent zonation. Because of its altitudinal limits, this vegetation lacks representatives of the lowermost and uppermost Uinta zones. It has an aspect of greater luxuriance than the Basin zones at the same altitude.

The south slopes of the Tavaputs Plateau, including the escarpments of the Brown and Book Cliffs, are also without a representation of those zones which are found in the high Uinta Mountains.

Near the crest of the Brown Cliffs there occurs an Aspen-Douglas Fir-Alpine Fir complex which is also found in upper canyons of the north face of the Tavaputs Plateau. There is considerable Limber Pine near the summit of the Brown Cliffs, and Douglas Fir is particularly common on the steep, rocky escarpment there. Below 9000 feet *Cercocarpus ledifolius* occurs, sometimes tree-like in size, and this species, with Amelanchier and Sagebrush, forms a zone comparable to the Basin's Sub-montane Shrub. At 8000 feet and below, oaks come into this mixture and in many places dominate it completely, as along Soldier Creek. At 6000 feet Juniper and Pinyon are abundant, especially the latter, and this gives way, at about 5500 feet, to Shadscale and other associations which are characteristic of the Basin's Mixed Desert Shrub Zone, with Mat Atriplex the most widespread association in the desert to the south. So, roughly, there is a zonation on the southern escarpment of the Tavaputs Plateau somewhat comparable to that on its northern face, except for the greater abundance, in those zones on the south, of certain species such as *Atriplex oblanceolata* at the base of the escarpment, Quercus and Cercocarpus at mid-altitude, and Douglas Fir in the uppermost elevations.

The east side of the Basin, like the west, does not reach downward to low elevations, but gradually rises into the White River Plateau and the foothills of the Rocky Mountains. Immediately east of the Basin the elevation varies from 6000 feet to 7500 feet or occasionally 8000 feet, and the vegetation is dominantly oak brush with Sagebrush openings. The narrower canyons support Aspen and Douglas Fir. East of the Basin, as one rises toward the ranges of the Rocky Mountain system, the flora changes with more eastern species in evidence, and the vegetation takes on a mesophytic appearance foreign to the Uinta Basin region.

PLANT COMMUNITIES

In any attempt to classify units of vegetation one finds complete consistency of treatment almost impossible. As in many other areas, the Uinta Basin presents altitudinal zones which are primarily due to climatic factors, such as moisture, temperature, length of growing season, and related phenomena. These have already been discussed. The climatic altitudinal zones, however, are often divisible into small-

er groups which are due to physiographic or edaphic factors. Such entities due to physiographic factors are exemplified by the Desert Gulch and Mid-altitude Valley. Both Gulch and Valley support a complex mixture of plant species scarcely meriting the rank of "association" in its absence of dominant or primary species, and yet quite distinct from the altitudinal zone which finds its expression on the face of the Basin slope to either side of the Gulch or Valley. In a broad sense, physiographic conditions, at least in arid regions, are often synonymous with conditions of local climate, as in the cases just cited. Edaphic entities are illustrated by most of the Mixed Desert Shrub Zone associations, such as the Sarcobatus Association or the Mat Atriplex Association, where both physical and chemical properties of the soil play significant parts in determining the association to be found there. Of course, it is often impossible to separate soil conditions from physiographic conditions, as is well shown by the River Flood-plain, where both physiography and soil are unique. It is also difficult to separate certain plant associations, not only from the soil and physiography, but from the general climate of the area, as is shown, for example, in the agreement between such associations as the Mid-altitude Artemisia Associations or the Picea-Abies Association and their respective altitudinal zones, the Submontane Shrub Zone and Spruce-Fir Zone, with which they coincide. Consequently, in this treatment, which deals only with the more obvious plant communities of the area under consideration, edaphic units of vegetation, such as most of the low altitude associations, physiographic complexes of vegetation as expressed by valley, lake and meadow, and climatic units such as the upper altitude forest associations, are all considered as comparable ultimate units of vegetation. An outline of the relation of these ultimate divisions to altitudinal zones is shown in Table 5.

It is unfortunate that our botanical exploration of the Uinta Basin was not possible fifty years sooner, for then the vegetation would have been in an undisturbed condition. Within the last half-century the plant cover must have changed greatly, due largely to overgrazing. This certainly affected the cover pattern in respect to numbers of individual plants, if not the floristic make-up of the vegetation, from which some species may have been exterminated. Many of the older inhabitants of the Basin were questioned in regard to this matter. Mr. D. Lewis Bills said that there was once enough bud

TABLE 5.

Outline of Plant Communities in the Uinta Basin and their relation to Altitudinal Vegetation Zones.

Upper Altitude	Alpine Zone	Sieversia-Carex Association.
	Spruce-Fir Zone	Picea-Abies Association. Upper-altitude Meadow. Upper-altitude Lake.
	Lodgepole Pine Zone	Pinus Murrayana Association.
Mid Altitude	Aspen Zone	Populus aurea Association. Mid-altitude Valley.
	Sub-montane Shrub Zone	Mid-altitude Artemisia Associations.
Low Altitude	Juniper-Pinyon Zone	Juniperus-Pinus Association.
	Mixed Desert Shrub Zone	Eurotia Association. Low-altitude Artemisia Association. Atriplex-Tetradymia Association. Chrysothamnus Association. Kochia-Hilaria Association. Mat Atriplex Association. Sarcobatus Association.
		Desert Gulch. Bad Lands. Distichlis Meadow. Scirpus-Typha Swamp. Cottonwood River Flood-Plain.

and curly sage and bunch grass in the region around Lapoint to winter cattle, but that now cattle would starve there in the summer time. Mr. George D. Merkley, who came to the Basin in 1879, said that the plants on the flats are the same now as then, except for Russian Thistle, but then there were five or six times as many of them and they were larger. Mr. George Thorne, who came in 1876, claims that near the head of Willow Creek there were meadows of grass among the Aspens only ten years ago where there is now bare ground with the stream dug in 10 or 12 feet deep. The sheep have eaten the grass and the killing of the beaver has eliminated their natural check dams. Mr. Thorne said that along lower Willow Creek 25 years ago the snow couldn't get deep enough to cover the natural brush feed, but that now a foot of snow covers it all. Mr. Neil Hanks said that at Willow Springs the Tavaputs Plateau was all grass 25 to 30 years ago. As the cattle ate the grass the Sagebrush came in and now, as is quite evident, the Aspens are stretching out from their formerly small clumps into the open spaces among the Sagebrush. Mrs. Robert Johnson, who lived as a child at Jensen, said that then, 25 years ago, the now practically barren yellow hills northeast of Jensen would be so covered with waving wildflowers at Decoration Day that they were gathered by the tubsful. Mrs. Hill said the Tavaputs Plateau area near Baxter Pass, Colorado, once had more Sagebrush but now there are as many wildflowers, in a wet year, as ever. However, before the sheep came in eighteen years ago they could drive a buckboard across the creek where now the stream flows in a vertically walled arroyo twelve feet deep, and at that time there was much more grass.

Throughout the following treatment of the plant communities of the Uinta Basin it must be remembered that it is not always easy to select in the field an association which exactly fits the community as here treated. We agree with Shreve (1915 p. 111) that in arid regions "it is nowhere possible to pick out a group of plants which may be thought of as associates without being able to find other localities in which the association has been dissolved. . . It is particularly true of the plant communities of arid and semi-arid regions that the most closely associated individuals are not alike in their life-requirements, and this is true to a less pronounced extent in all plant communities." However, the occurrence of well-marked groups of plants with conspicuously characteristic dominants is likewise a

feature of semi-arid regions, and the present treatment of plant communities is an attempt to classify the vegetation of the area according to such conspicuously different units, in spite of minor variations of, or differences in, their make-up. A summary of such plant communities of the Uinta Basin follows.

COTTONWOOD RIVER FLOOD-PLAIN (See Plate VI, Fig. 2.)

On the mature flood-plains of the larger rivers, such as the Green, White, and Uinta, there exist solid stands of Cottonwood, *Populus Sargentii*. This tree grows on alluvial soil occasionally inundated by spring floods and in the Uinta Basin is most abundant between the altitudes of 4500 and 5500 feet. Under the Cottonwoods there is frequently a shrub layer made up of *Rosa puberulenta*, *Rhus trilobata*, and *Lepargyrea argentea*. Along the river banks occur margins of *Salix amygdaloides* and *Salix exigua*. Below and among the shrubs there is a comparatively heavy herbaceous vegetation, a feature not often observed in the other low altitude associations of the Basin. The following are important secondary species:

Eleocharis macrostachya
Scirpus americanus
Scirpus occidentalis
Smilacina stellata
Atriplex Nuttallii
Chenopodium Berlandieri
Cheopodium Fremontii
Clematis ligusticifolia
Ranunculus Cymbalaria saximontanus
Cleome lutea
Cleome serrulata
Descurainia brachycarpa
Sisymbrium altissimum
Ribes aureum
Potentilla Anserina
Potentilla pentandra
Glycyrrhiza lepidota
Chamaesyce serpyllifolia
Toxicodendron Rydbergii
Cicuta occidentalis
Asclepias speciosa
Helenium montanum
Helianthus petiolaris
Iva axillaris
Solidago missouriensis
Xanthium saccharatum

SCIRPUS-TYPHA SWAMP (See Plate VII, Fig. 1.)

At a few localities along the larger rivers, where the soil is poorly drained and water accumulates, there have developed marshes or swamps. These are rare and notably developed only at the mouth of Ashley Creek on the Green River, where the Creek fingers out as a choked stream. The dominant plant is *Scirpus occidentalis*, with

Typha latifolia playing a less prominent role. The following are important secondary species:

Sagittaria cuneata
Phragmites communis
Polypogon monspeliensis
Eleocharis macrostachya
Carex nebraskensis
Scirpus americanus
Scirpus paludosus
Triglochin maritima
Polygonum natans
Polygonum Persicaria
Ranunculus Cymbalaria saximontanus
Ranunculus sclereratus multifidus
Epilobium adenocaulon
Hippurus vulgaris
Berula erecta

DISTICHLIS MEADOW (See Plate VII, Fig. 2.)

On certain flats along the Green River which have an impervious alkaline soil and are regularly inundated by spring floods, there occur meadows of Salt Grass, *Distichlis stricta*, often composed solely of this species. Such meadows are rare in the Basin, but one well developed meadow occurs south of the mouth of Ashley Creek.

BAD LANDS (See Plate VIII, Fig. 1.)

In many parts of the lower Basin, especially flanking the lowlands of the major streams, the soil is of such a nature that little vegetation is able to flourish and the rains have eroded the underlying shales, clays and sandstones into fantastic bad lands. On these areas nothing grows except along the drainage ways where an occasional Greasewood, *Sarcobatus vermiculatus*, or *Rumex hymenosepalus* may exist. *Atriplex corrugata* and *A. oblanceolata* may occur sparingly. In the early spring, however, there develops a scanty flora along the drainage courses between the bald, colorful mounds and turrets of the bad lands proper. The most important of these spring plants, many of which are stunted, dwarfed representatives of species from surrounding associations, are the following:

Allium textile
Brodiaea Paysonii
Eriogonum inflatum
Eriogonum salsuginosum
Descurainia halictorum
Streptanthella longirostris
Thelypodiopsis wyomingensis
Astragalus Chamaeleuce
Astragalus flavus
Astragalus spatulatus
Oenothera caespitosa montana
Oenothera scapoidea typica
Phacelia demissa
Enceliopsis nutans

DESERT GULCH (See Plate VIII, Fig. 2.)

Within the altitudinal limits of the Mixed Desert Shrub Zone, 4500-5500 feet, there are narrow gulches of short length which, while less xerophytic than the bordering desert areas, still do not harbor a typical mid-altitude valley vegetation. These are typically represented by the gulches near the Dinosaur National Monument, which enter the Green River. Within their comparatively mesophytic environment the following species often occur:

Equisetum kansanum
Hordeum jubatum
Phragmites communis
Eleocharis macrostachya
Scirpus americanus
Juncus balticus montanus
Smilacina stellata
Populus angustifolia
Salix exigua
Salix lutea
Salix monticola
Betula fontinalis
Celtis Douglasii
Comandra pallida
Ranunculus Cymbalaria saximontanus
Odostemon Aquifolium
Erysimum asperum
Ribes aureum
Amelanchier pallida
Amelanchier prunifolia
Thermopsis ovata
Rhus trilobata
Dodecatheon pauciflorum
Fraxinus anomala
Viola nephrophylla
Lepargyrea argentea
Acer interior

SARCOBATUS ASSOCIATION (See Plate IX, Fig. 1.)

Between the belt of Cottonwoods along the larger rivers and the bad lands bluffs there is a lowland area of fine, compact soil high in alkali content and with a high water table which harbors a plant cover dominated by the Greasewood, *Sarcobatus vermiculatus*. In parts of this association *Atriplex argentea*, *A. confertifolia* and *A. Powellii* are sometimes important primary species. This same type of vegetation covers the flood-plains of the smaller streams in the Mixed Desert Shrub Zone where the Cottonwoods are absent. In some places the Greasewood is mixed with, and merges into, the Atriplex-Tetradymia Association. The following are important secondary species:

Allium textile
Atriplex corrugata
Atriplex Nuttallii
Atriplex oblanceolata
Atriplex tridentata
Atriplex Wolfii
Dondia Torreyana
Grayia spinosa
Monolepis pusilla
Rumex hymenosepalus

Eriogonum inflatum
Eriogonum salsuginosum
Abronia micrantha
Descurainia brachycarpa
Astragalus Geyeri
Astragalus pubentissimus
Oenothera contorta flexuosa
Oenothera minor typica
Gilia polycladon
Phacelia Ivesiana
Cryptantha Kelseyana
Lappula texana
Chaenactis Stevioides
Chrysothamnus nauseosus graveolens
Helianthus lenticularis
Malacothrix sonchoides

MAT ATRIPLEX ASSOCIATION (See Plate IX, Fig. 2.)

Where the soil is impervious and white alkali often lies on the surface, especially below bad lands areas, there is a plant community dominated, and often consisting solely of, two species of low, mat-forming plants, *Atriplex oblanceolata* and *Atriplex corrugata*. Sometimes species of the Kochia-Hilaria Association, or vernal plants from other Mixed Desert Shrub Zone associations appear within this association, but, like the bad lands, most of the year finds this type of plant community devoid of any variety in appearance.

KOCHIA-HILARIA ASSOCIATION (See Plate X, Fig. 1.)

On rocky benches and flats of the Mixed Desert Shrub Zone, as on Leland Bench, where the soil is very coarse, there exists a complex which is dominated by Gray Molly, *Kochia vestita*, and the grass, *Hilaria Jamesii*. With these two primary species, there often appear *Atriplex corrugata* and *A. oblanceolata*, as well as species common to the Atriplex-Tetradymia Association. Shantz (1925 p. 19) says that in areas dominated by Kochia the amount of alkali is so great at a depth of 10 or 12 inches that plant roots cannot develop. The following are significant secondary species:

Atriplex confertifolia
Atriplex corrugata
Atriplex oblanceolata
Arabis formosa
Lepidium montanum Jonesii
Streptanthella longirostris
Thelypodiopsis wyomingensis
Astragalus Chamaeleuce
Astragalus duchesnensis
Astragalus flavus
Lupinus pusillus
Sphaeralcea coccinea
Sclerocactus Whipplei
Utahia Sileri
Oenothera scapoidea typica
Oenothera trichocalyx
Asclepias cryptoceras
Phacelia crenulata corrugata
Cryptantha flava
Cryptantha paradoxa
Castilleja chromosa

CHRYSOTHAMNUS ASSOCIATION (See Plate X, Fig. 2.)

On benches and flats where the soil is sandy, as on the Leota Bench, there is a plant community which merges into the Atriplex-Tetradymia Association, but which in many spots has a character of its own. It is dominated by the Rabbitbrush, *Chrysothamnus stenophyllus*, although *Opuntia rhodantha* is often a conspicuous plant among the Rabbitbrush. Other species sometimes occupying primary positions are *Atriplex confertifolia*, *Grayia spinosa*, and *Tetradymia spinosa*, while significant secondary species are the following:

Aristida Fendleriana
Distichlis stricta
Festuca octoflora
Hordeum jubatum
Oryzopsis hymenoides
Sitanion jubatum
Sporobolus contractus
Eriogonum campanulatum
Abronia elliptica
Descurainia halictorum
Streptanthella longirostris
Chamaesyce Fendleri
Mentzelia albicaulis
Cymopterus acaulis
Cymopterus bulbosus
Nama densum parviflorum
Chrysothamnus viscidiflorus

ATRIPLEX-TETRADYMIA ASSOCIATION (See Plate II, Fig. 1.)

The greater part of the Mixed Desert Shrub Zone, between the altitudes of 4500 and 5500 feet, is occupied with a complex dominated by Shadscale, *Atriplex confertifolia*, and *Tetradymia spinosa*. In many places *Artemisia spinescens* ranks as an equally important species, although it never forms definite associations of its own here as it does in some parts of Utah. The soil here is less porous and usually heavier than in nearby Sagebrush areas. Originally the land occupied by the Atriplex-Tetradymia Association may have been dominated by the Atriplex alone, but cropping of the Atriplex by sheep has permitted the spiny, protected Tetradymia to become of equal abundance with the Atriplex, if indeed it might not, under continued over-grazing, entirely supplant the Atriplex. In certain parts of this association *Tetradymia Nuttallii* is a common plant, and may reach a primary status. The secondary species of this widespread association include the following:

Ephedra Torreyana
Aristida Fendleriana
Elymus salina
Oryzopsis hymenoides
Poa secunda
Puccinellia Nuttalliana
Sitanion jubatum
Sporobolus airoides
Stipa comata
Zygadenus paniculatus

Eriogonum salsuginosum
Eriogonum Shockleyi
Atriplex canescens
Atriplex Nuttallii
Monolepis Nuttalliana
Chenopodium leptophyllum
Abronia elliptica
Abronia micrantha
Hermidium alipes
Cleome lutea
Polanisia trachysperma
Arabis formosa
Arabis retrofracta
Lepidium densiflorum ramosum
Lepidium montanum Jonesii
Lesquerella ludoviciana
Physaria didymocarpa australis
Sisymbrium linifolium
Stanleya arcuata
Streptanthella longirostris
Streptanthus cordatus
Thelypodiopsis wyomingensis
Arenaria Eastwoodiae
Astragalus Coltoni
Astragalus cymboides
Astragalus duchesnensis
Astragalus inflexus
Astragalus flavus
Astragalus pubentissimus
Astragalus vespertinus
Oxytropis albiflorus
Psoralea mephitica
Linum Lewisii
Chamaesyce Fendleri
Tithymalus robustus
Sphaeralcea parvifolia
Mentzelia albicaulis
Opuntia rhodantha
Pediocactus Simpsoni
Sclerocactus Whipplei
Oenothera caespitosa montana
Oenothera scapoidea typica
Oenothera trichocalyx
Cymopterus duchesnensis
Asclepias cryptoceras
Phacelia crenulata corrugata
Phacelia Ivesiana
Gilia congesta
Gilia inconspicua
Gilia pumila
Cryptantha breviflora
Cryptantha flava
Cryptantha flavoculata
Cryptantha nana
Lappula Redowskii desertorum
Penstemon pachyphyllus
Plantago Purshii
Galium coloradense
Aplopappus Nuttallii
Aster leucanthemifolius
Aster leucelene
Chaenactis Douglasii
Chaenactis Stevioides
Enceliopsis nudicaulis
Erigeron argentatus
Gutierrezia Sarothrae
Helianthus lenticularis
Hymenopappus eriopodus
Malachothrix sonchoides
Malachothrix Torreyi
Tetradymia Nuttallii
Wyethia scabra

During most of the year the Atriplex-Tetradymia Association is devoid of showy flowering plants, but during the month of May, under normal conditions, there is a vernal aspect of this association composed largely of the following herbaceous species:

Allium nevadense
Allium textile
Brodiaea Paysonii
Calochortus Nuttallii
Descurainia halictorum
Descurainia halictorum osmiarum
Erysimum asperum
Thelypodiopsis wyomingensis
Astragalus ceramicus

Astragalus ceramicus longifolius	Cymopterus purpureus
Astragalus Chamaeleuce	Pteryxia terebinthina calcarea
Lupinus pusillus	Phlox Hoodii
Sphaeralcea coccinea	Phlox longifolia
Cymopterus acaulis	Phacelia demissa
Cymopterus bulbosus	Castilleja chromosa
Cymopterus purpurascens	Penstemon Fremontii

On particularly rocky areas of the Atriplex-Tetradymia Association the following species are present:

Yucca Harrimaniae	Aplopappus acaulis
Eriogonum ovalifolium	Aplopappus acaulis glabratus
Eriogonum ovalifolium purpureum	Actinea acaulis arizonica
	Actinea acaulis lanigera
Arenaria Hookeri	Actinea acaulis simplex
Caulanthus crassicaulis	Aster venustus
Lesquerella condensata laevis	Bahia ourolepis
Streptanthus cordatus	Erigeron concinnus
Astragalus spatulatus	Thelesperma subnudum
Leptodactylon pungens	Townsendia incana

LOW ALTITUDE ARTEMISIA ASSOCIATION (See Plate XI, Fig. 1.)

In the upper part of the Mixed Desert Shrub Zone, Sagebrush, *Artemisia tridentata*, sometimes becomes the dominant plant. It also occurs scattered throughout the Juniper-Pinyon Zone to a certain extent, to reappear at higher elevations as a flourishing dominant in certain parts of the Sub-montane Shrub Zone. Many species accompany it throughout this altitudinal range. It occupies those areas which are well drained, with porous soils nearly free from alkali, and often occurs on the coarse soil of arroyos or stream bottoms in regions otherwise occupied by the Atriplex-Tetradymia complex. Many of the species listed for the Atriplex-Tetradymia Association may also occur with the low altitude Sagebrush. Except along permanently moist water courses, Sagebrush at low altitude in the Uinta Basin is a poor plant seldom more than three feet tall. In the Mixed Desert Shrub Zone the following species are important associates of Sagebrush:

Ephedra viridis	Abronia elliptica
Allium textile	Arabis retrofracta
Calochortus Nuttallii	Amelanchier utahensis
Zygadenus paniculatus	Delphinium Menziesii

Delphinium Nelsonii
Astragalus diversifolius
Lupinus argenteus
Linum Lewisii
Tithymalus robustus
Sphaeralcea coccinea
Sphaeralcea parvifolia
Castilleja chromosa
Penstemon caespitosus
Penstemon Fremontii
Penstemon Osterhoutii
Thalesia fasciculata

EUROTIA ASSOCIATION (See Plate XI, Fig. 2.)

In fairly well drained soils near the upper limit of the Mixed Desert Shrub Zone there often occur nearly solid covers of Winter Fat, *Eurotia lanata*. According to natives, it was at one time more common than now. Mixed with this species there sometimes occur members of the Low Altitude Artemisia and Atriplex-Tetradymia Associations. *Poa secunda* and *Agropyron Smithii molle* are often conspicuous associates of Eurotia. Winter Fat is very valuable as winter feed for sheep, although it seldom occurs over extensive areas in the Uinta Basin.

JUNIPERUS-PINUS ASSOCIATION (See Plate II, Fig. 2.)

The primary component of this zonal association is the Utah Juniper, *Juniperus utahensis*, with the Pinyon Pine, *Pinus edulis*, forming a less important primary species. In some parts of the Basin these two species may be equally abundant. The Juniperus-Pinus Association occupies the rank of an altitudinal zone also, and is remarkably uniform in composition, and distinctly delimited as to the elevation it occupies (see p. 46). Secondary species of this zonal association include the following:

Woodsia oregana
Ephedra viridis
Bromus inermis
Sitanion Hystrix
Stipa comata
Yucca Harrimaniae
Eriogonum alatum
Eriogonum Batemani
Eriogonum cernuum
Eriogonum ovalifolium purpureum
Atriplex canescens
Chenopodium leptophyllum
Amaranthus blitoides
Arenaria Eastwoodiae
Arenaria Hookeri
Erysimum asperum
Physaria didymocarpa australis
Stanleya arcuata
Philadelphus microphyllus
Philadelphus occidentalis
Amelanchier utahensis
Cercocarpus montanus
Prunus melanocarpa
Astragalus spatulatus
Astragalus spatulatus simplex
Astragalus tenellus
Lupinus argenteus

Thermopsis ovata
Linum Lewisii
Echinocereus mojavense
Pediocactus Simpsoni
Oenothera lavandulifera glandulosa
Cogswellia Grayi
Cymopterus acaulis
Cymopterus longipes
Cymopterus purpureus
Pteryxia terebinthina calcarea
Gilia pulchella
Leptodactylon pungens
Phlox longifolia
Cryptantha flavoculata
Lithospermum incisum
Phacelia Ivesiana
Castilleja chromosa
Penstemon humilis
Penstemon pachyphyllus
Actinea acaulis arizonica
Aplopappus acaulis
Aplopappus acaulis glabratus
Aplopappus Nuttallii
Artemisia nova
Artemisia tridentata
Aster leucanthemifolius
Aster leucelene
Balsamorhiza hirsuta neglecta
Chaenactis Douglasii
Chrysopsis villosa
Chrysothamnus viscidiflorus
Gutierrezia Sarothrae
Ptiloria tenuifolia

MID-ALTITUDE ARTEMISIA ASSOCIATIONS (See Plate III, Fig. 1.)

The floristic composition of the Sub-montane Shrub Zone, with which the Artemisia Associations are synonymous, varies considerably, like that of the herbaceous element of the Aspen Zone, with the geographic position it occupies. While Artemisia is almost everywhere a conspicuous shrub, it seems to represent a life-form rather than a specific element. In many parts of the Basin *Artemisia tridentata* predominates, but in the west end of the Basin, as at Horse Creek and Moon Lake, *Artemisia cana* takes its place. On certain parts of the south slope of the Uinta Mountains, especially north of Vernal, *Artemisia nova* dominates the zone, particularly on poor, rocky soil. Almost invariably associated with the Sagebrush, especially with *Artemisia tridentata*, are the other shrubby species, *Amelanchier pallida*, *Amelanchier prunifolia*, *Cercocarpus montanus*, *Purshia tridentata*, and *Symphoricarpos vaccinioides*. Other shrubs of less importance are *Philadelphus occidentalis*, *Tetradymia canescens inermis*, and occasionally *Juniperus scopulorum*. It is in this zone that the oaks, primarily *Quercus utahensis* and *Quercus Gambellii*, occur, although they are nowhere of extensive significance except near the southern rim of the Basin. The herbaceous element of these Mid-altitude Artemisia Associations does not vary greatly, but there is some localization of components. Found only on the Tavaputs Plateau, for

instance, were *Calochortus Gunnisonnii, Oxytropis Lambertii, Viguiera multiflora, Rosa malina, Opulaster alternans,* and others. The following species represent most of the secondary species which commonly occur in the Mid-altitude Artemisia Associations:

Elymus salina
Koeleria cristata
Poa arida
Poa Fendleriana
Poa palustris
Sitanion Hystrix
Stipa comata intermedia
Stipa Lettermani
Carex petasata
Carex vallicola
Allium brevistylum
Calochortus Nuttallii
Fritillaria atropurpurea
Zygadenus paniculatus
Comandra pallida
Eriogonum heracleoides
Eriogonum neglectum
Eriogonum umbellatum
Polygonum Douglasii
Allionia glandulifera
Clematis hirsutissima
Delphinium dumetorum
Delphinium Menziesii
Delphinium Nelsonii
Potentilla filipes
Arabis Drummondii
Arabis glabra
Erysimum asperum
Physaria didymocarpa australis
Sedum stenopetalum
Heuchera parvifolia utahensis
Astragalus diversifolius
Astragalus flexuosus
Astragalus hylophilus
Astragalus spatulatus
Astragalus tenellus
Hedysarum utahense
Lupinus argenteus
Lupinus parviflorus
Lupinus sericeus
Trifolium gymnocarpon
Vicia oregana
Linum Lewisii
Gayophytum racemosum
Tithymalus robustus
Geranium viscosissimum
Viola praemorsa linguaefolia
Viola vallicola
Oenothera caespitosa montana
Oenothera coronopifolia
Cogswellia Grayi
Cogswellia juniperina
Cymopterus longipes
Ligusticum Porteri
Androsace septentrionalis
Frasera speciosa
Collomia linearis
Gilia pulchella
Linanthus Harknessii
Phlox longifolia
Phlox multiflora
Phacelia sericea
Phacelia sericea ciliosa
Hackelia patens
Mertensia fusiformis
Dracocephalum parviflorum
Lithospermum lanceolatum
Castilleja chromosa
Castilleja flava
Castilleja linariaefolia
Orthocarpus Tolmiei
Penstemon caespitosus
Penstemon comarrhenus
Penstemon humilis
Penstemon pachyphyllus
Penstemon strictus
Penstemon subglaber
Penstemon Watsonii
Thalesia fasciculata
Galium boreale
Valeriana edulis
Achillea lanulosa

Actinea acaulis arizonica
Actinea Richardsonii
Actinea Torreyana
Antennaria dimorpha
Antennaria rosea
Antennaria microphylla
Artemisia dracunculoides
Aster leucanthemifolius
Balsamorhiza hirsuta neglecta
Balsamorhiza sagittata
Chaenactis Douglasii
Chrysopsis villosa
Cirsium pulchellum
Cirsium undulatum
Crepis intermedia
Crepis scopulorum
Erigeron Eatonii
Erigeron macranthus
Gutierrezia Sarothrae
Helianthella quinquenervis
Senecio cymbalarioides
Senecio Hookeri
Senecio multicapitatus
Senecio uintahensis
Solidago petradoria

MID-ALTITUDE VALLEY (See Plate IV, Fig. 1.)

The vegetation of the mid-altitude valleys is distinct from that at the same altitude on the face of the adjoining Basin slopes. These valleys are more mesophytic, and are typically developed between the altitudes of 6000 and 8000 feet. Where the valley is narrow, and rock-sided, the Douglas Fir, *Pseudotsuga mucronata*, is often the dominant tree; where the valley is dry and open, with a gravelly bottom, the Rocky Mountain Yellow Pine, *Pinus scopulorum*, occupies the primary position; where it is moist, the Blue Spruce, *Picea pungens*, is often the common tree. At lowermost altitudes the Narrow Leaf Cottonwood, *Populus angustifolia*, is frequently an accompanying species, giving way to the Aspen, *Populus aurea*, in the uppermost parts of the valleys. *Pinus flexilis* also occurs here, with *Acer interior* another conspicuous tree. *Juniperus scopulorum*, although nowhere common in the Basin, also occurs in these valleys. The following are the most common secondary species:

Woodsia oregana
Selaginella mutica
Equisetum arvense
Equisetum kansanum
Equisetum praealtum
Sagittaria cuneata
Agrostis alba
Catabrosa aquatica
Elymus condensatus
Hordeum nodosum
Phleum pratense
Poa longiligula
Poa pratensis
Poa secunda
Polypogon monspeliensis
Carex Douglasii
Carex lanuginosa
Carex nebraskensis
Carex praegracilis
Carex vallicola
Eleocharis arenicola
Scirpus americanus
Juncus balticus montanus
Juncus brunnescens

Juncus bufonius
Juncus longistylis
Juncus nodosus
Juncus xiphioides montanus
Smilacina amplexicaulis
Smilacina stellata
Iris missouriensis
Sisyrinchium occidentale
Cytherea bulbosa
Epipactus gigantea
Habenaria hyperborea
Salix caudata Bryantiana
Salix exigua
Salix exigua stenophylla
Salix Geyeriana
Salix lasiandra
Salix lutea
Salix monticola
Salix subcoerulea
Betula fontinalis
Alnus tenuifolia
Comandra pallida
Urtica strigosissima
Eriogonum microthecum
Cerastium oreophilum
Anemone cylindrica
Clematis ligusticifolia
Ranunculus Cymbalaria saximontanus
Ranunculus glaberrimus ellipticus
Odostemon Aquifolium
Capnoides aureum
Capnoides montanum
Ribes aureum
Ribes inebrians
Crataegus rivularis
Potentilla concinna
Potentilla virescens
Cleome lutea
Cleome serrulata
Arabis retrofracta
Cardamine pennsylvanica
Draba nitida
Sisymbrium altissimum
Thlaspi glaucum
Philadelphus microphylla
Prunus melanocarpa
Rosa puberulenta
Lupinus parviflorus
Thermopsis montana
Trifolium repens
Toxicodendron Rydbergii
Acer glabrum
Viola adunca
Viola pallens
Viola nephrophylla
Opuntia juniperina
Lepargyrea argentea
Epilobium adenocaulon
Epilobium angustifolium
Cicuta occidentalis
Cogswellia platycarpa
Pastinaca sativa
Cornus instolonea
Arctostaphylos platyphylla
Arctostaphylos Uva-ursi
Androsace septentrionalis
Pyrola uliginosa
Dodecatheon pauciflorum
Gentiana heterosepala
Asclepias speciosa
Gilia pulchella
Castilleja linariaefolia
Castilleja septentrionalis
Collinsia parviflora
Mertensia fusiformis
Lonicera involucrata
Symphoricarpos occidentalis
Veronica anaga'lis-aquatica
Galium boreale
Campanula petiolata
Aster adscendens
Chrysopsis villosa
Erigeron canadensis
Erigeron glabellus
Helianthus aridus
Helianthus Nuttallii
Lactuca pulchella
Solidago altissima

POPULUS AUREA ASSOCIATION (See Plate IV, Fig. 2.)

The herbaceous vegetation associated with the Aspens is the most luxuriant of any in the Basin, a condition which in itself argues against the theory that Aspens occupy only old burns. This rather mesophytic herbaceous element varies somewhat in different parts of the Basin. For instance, in the west end of the Basin along Red and Horse Creeks, almost the sole ground cover is *Nemophila breviflora*, which we found nowhere else in the Basin. Also confined to the west end of the Basin are *Hydrophyllum capitatum*, *Wyethia amplexicaulis*, *Acer grandidentatum*, *Scrophularia lanceolata*, and *Lathyrus coreaceus*. On the other hand, *Juniperus sibirica* is conspicuously absent there, although in the Uintas proper it is usually found with the Aspen. Similarly, on the Tavaputs Plateau, the Aspen Zone harbored *Ranunculus Macounii*, *Lupinus barbiger*, and *Vicia oregana*, as well as other species not observed in other parts of the Basin. Among the Aspens grassy meadows of varying extent sometimes occur. Almost universally associated with the Aspen, as other primary species of the association, are the following:

Juniperus sibirica
Aquilegia coerulea
Clematis hirsutissima
Prunus melanocarpa
Rosa chrysocarpa
Rosa manca
Rosa puberulenta
Lupinus parviflorus
Geranium Richardsonii
Frasera speciosa

The most common secondary species of the *Populus aurea* Association are the following:

Cystopteris fragilis
Equisetum arvense
Equisetum praealtum
Agrostis hiemalis
Agropyron pauciflorum
Catabrosa aquatica
Koeleria cristata
Poa curta
Poa Fendleriana
Poa nervosa
Poa pratensis
Stipa comata intermedia
Stipa Lettermani
Carex disperma
Carex festivella
Carex occidentalis
Carex rostrata
Carex Vahlii
Carex vallicola
Juncus balticus montanus
Allium brevistylum
Fritillaria atropurpurea
Smilacina amplexicaulis
Smilacina stellata
Iris missouriensis
Sisyrinchium occidentale
Corallorrhiza maculata
Corallorrhiza striata
Salix Bebbiana perrostrata
Salix caudata Bryantiana
Salix Geyeriana
Salix pseudo-cordata

Salix pseudo-cordata aequalis
Salix subcoerulea
Alnus tenuifolia
Polygonum bistortoides
Rumex mexicanus
Blitum capitatum
Claytonia lanceolata
Alsine Jamesiana
Arenaria Burkei
Cerastium oreophilum
Moehringia lateriflora
Silene Menziesii
Aconitum columbianum
Actaea arguta
Clematis pseudoalpina
Delphinium cucullatum
Delphinium Nelsonii
Ranunculus Cymbalaria saximontanus
Ranunculus inamoenus
Odostemon Aquifolium
Thalictrum Fendleri
Arabis retrofracta
Arabis Drummondii
Cardamine infausta
Draba nemorosa
Sedum stenopetalum
Lithophragma bulbifera
Geum macrophyllum
Ribes inerme
Ribes inebrians
Ribes montigenum
Ribes viscosissimum
Amelanchier florida
Amelanchier pallida
Cercocarpus ledifolius
Fragaria glauca
Potentilla filipes
Potentilla Nuttallii
Potentilla pulcherrima
Rubus parviflorus
Sieversia turbinata
Sorbus scopulina
Astragalus hylophilus
Lupinus barbiger
Geranium viscosissimum
Ceanothus velutinus
Acer glabrum
Pachystima Myrsinites
Viola adunca
Viola nephrophylla
Viola pallens
Epilobium adenocaulon
Epilobium angustifolium
Epilobium saximontanum
Cogswellia platycarpa
Ligusticum Porteri
Osmorhiza obtusa
Pyrola chlorantha
Pyrola uliginosa
Androsace septentrionalis
Arctostaphylos platyphylla
Arctostaphylos Uva-ursi
Dodecatheon pauciflorum
Collomia linearis
Phacelia sericea
Phacelia sericea ciliosa
Castilleja Leonardi
Castilleja miniata
Castilleja rhexifolia
Mertensia arizonica Leonardi
Mimulus guttatus
Pedicularis procera
Penstemon strictus
Penstemon subglaber
Penstemon Whippleanus
Veronica americanus
Galium boreale
Lonicera involucrata
Sambucus coerulea
Sambucus melanocarpa
Valeriana occidentalis
Campanula petiolata
Achillea lanulosa
Arnica cordifolia
Aster adscendens
Aster leucanthemifolius
Erigeron Eatonii
Helianthella quinquenervis
Helianthella uniflora
Senecio cymbalarioides
Senecio Hookeri
Senecio uintahensis
Solidago trinervata

PINUS MURRAYANA ASSOCIATION (See Plate V, Fig. 1.)

The Lodgepole Pine, *Pinus Murrayana*, forms the most extensive forests in the Uinta Mountains. The trees are close together, and there is usually very little vegetation on the forest floor. *Vaccinium scoparium* often carpets the ground under Lodgepole, however, and *Pedicularis racemosa* also occurs frequently there. Other species of this forest are the following:

Cystopteris fragilis
Juniperus sibirica
Agrostis hiemalis
Poa nervosa
Allium brevistylum
Zygadenus elegans
Alsine borealis
Alsine longifolia
Sagina saginoides
Anemone globosa
Arabis Drummondii
Sedum stenopetalum
Micranthes arguta
Ribes inebrians
Ribes inerme
Ribes montigenum
Ribes viscosissimum
Rubus melanolasius
Rubus parviflorus
Sorbus scopulina
Pachystima Myrsinites
Ceanothus velutinus
Lepargyrea canadensis
Epilobium alpinum
Epilobium angustifolium
Epilobium saximontanum
Angelica Roseana
Arctostaphylos Uva-ursi
Pyrola chlorantha
Pyrola uliginosa
Vaccinium caespitosum
Vaccinium occidentale
Frasera speciosa
Castilleja Leonardi
Castilleja miniata
Lonicera involucrata
Sambucus microbotrys
Arnica cordifolia
Arnica latifolia
Solidago decumbens
Solidago Parryi

UPPER ALTITUDE LAKE (See Plate XII, Fig. 1.)

Throughout the Lodgepole Pine and Spruce-Fir Zones there are a great many glacial lakes, most of which are rather small. Perhaps none is more than a quarter of a mile in width. There is great variation in the vegetation of these lakes. Those lakes which were scoured from solid rock, the rock-basin lakes, are practically devoid of vascular plants. The others, or morainic dam lakes, vary from lakes with little vegetation in them to those which are becoming choked with plants, having species of sedge around the margins and Nymphaea in the center. This vegetational occupance has advanced, in some cases, to the point where only a wet meadow of Carex indicates the the former existence of the lake. The writer has elsewhere (see

Graham 1937b) referred to the scarcity of Sphagnum moss in upper altitude lakes and meadows of the Uinta Mountains. The following species are important occupants of the lakes and lake margins:

Isoetes Bolanderi
Sparganium angustifolium
Potamogeton angustifolius?
Carex aquatilis
Carex brunnescens
Carex physocarpa
Carex rostrata
Eleocharis palustris major
Juncus Drummondii
Juncus Mertensianus
Salix planifolia
Nymphaea polysepala
Ranunculus reptans strigulosus
Ranunculus tricophyllus typicus
Callitriche palustris

UPPER ALTITUDE MEADOW (See Plate XII, Fig. 2.)

Throughout the Lodgepole Pine and Spruce-Fir Zones there are many meadows. Some of these are small and moist, representing probably the last stages of glacial lakes. Others are much larger and drier and may be either the result of fires in the forest or due to rocky soil, exposure to wind, or other natural causes. In very wet meadows, and along open streams in these upper zones, the following species occur:

Carex disperma
Carex ebenea
Carex epapillosa
Carex Haydeniana
Carex nigricans
Carex Vahlii
Eriophorum polystachion
Juncus albescens
Juncus Drummondii
Luzula Piperi
Luzula spicata
Habenaria dilatata
Spiranthes Romanzoffiana
Salix planifolia
Salix pseudo-cordata aequalis
Salix pseudo-lapponum
Salix subcoerulea
Salix Wolfii
Betula glandulosa
Polygonum bistortoides
Polygonum viviparum
Aconitum columbianum
Caltha rotundifolia
Trollius albiflorus
Saxifraga rhomboidea
Nasturtium obtusum alpinum
Clementsia rhodantha
Epilobium anagallidifolium
Epilobium Hornemannii
Kalmia microphylla
Dodecatheon alpinum
Primula Parryi
Gentiana Fremontii
Gentiana monantha
Gentiana Parryi
Gentiana Romanzovii
Swertia palustris
Mimulus Lewisii
Pedicularis groenlandica surrecta
Pedicularis Parryi
Veronica humifusa
Veronica Wormskjoldii
Lonicera involucrata

On drier, more rocky, open situations which might be termed dry meadows or parks, the following species occur:

Selaginella Watsoni
Alopecurus alpinus
Bromus ciliatus
Calamagrostis canadensis
Danthonia intermedia
Deschampsia caespitosa
Glyceria borealis
Phleum alpinum
Poa alpina
Poa epilis
Poa secunda
Trisetum spicatum
Trisetum Wolfii
Carex Egglestonii
Rumex paucifolius
Oreobroma pygmaea
Alsine laeta
Cerastium oreophilum
Draba aurea
Draba nitida
Thlaspi glaucum
Saxifraga debilis
Mitella stenopetala
Dasiphora fruticosa
Fragaria glauca
Potentilla glaucophylla
Sibbaldia procumbens
Sieversia turbinata
Thermopsis montana
Trifolium Parryi
Viola bellidifolia
Viola pallens
Geranium Richardsonii
Ligusticum tenuifolium
Androsace septentrionalis
Gaultheria humifusa
Polemonium pulcherrimum
Mertensia ciliata
Castilleja pulchella
Castilleja rhexifolia
Castilleja septentrionalis
Castilleja viscida
Pedicularis Paysoniana
Penstemon procerus
Penstemon Whippleanus
Penstemon uintahensis
Valeriana edulis
Valeriana occidentalis
Campanula petiolata
Achillea lanulosa alpicola
Actinea acaulis arizonica
Agoseris glauca
Antennaria corymbosa
Arnica cordifolia
Arnica foliosa
Arnica mollis
Artemisia scopulorum
Aster glaucodes
Erigeron salsuginosus
Solidago ciliosa

PICEA-ABIES ASSOCIATION (See Plate V, Fig. 2.)

The Spruce-Fir Zone, like some of the other altitudinal zones of the Basin, is synonymous with the association comprising it. Spruce-Fir forest is extensive in the Uinta Mountains, and second only in extent to the Lodgepole Pine; both are lumbered to some degree. The Spruce, *Picea Engelmanni*, is everywhere the commoner tree, with the Alpine Fir, *Abies lasiocarpa*, of less frequent occurrence. However, where these trees reach above their usual zonal limits as dwarfs in the Alpine Zone, the Alpine Fir often becomes the commoner and frequently extends to a higher altitude than the Engel-

mann's Spruce. The floor of the forest is usually bare of herbaceous under-cover, but the following species occur here, many of which, like *Alopecurus aequalis*, are usually found in rather moist, open areas among the trees:

Cystopteris fragilis
Woodsia scopulina
Selaginella Watsoni
Juniperus sibirica
Agrostis humilis
Agrostis Rossae
Alopecurus aequalis
Deschampsia caespitosa
Festuca ovina
Festuca ovina brachyphylla
Poa nervosa
Poa secunda
Trisetum spicatum
Carex concolor
Carex nigricans
Carex pseudo-scirpoidea
Juncus Drummondii
Lloydia serotina
Veratrum californicum
Zygadenus elegans
Salix pseudo-lapponum
Alsine baicalensis
Alsine longifolia
Arenaria Burkei
Lychnis Drummondii
Anemone globosa
Thalictrum sparsiflorum
Arabis Drummondii
Sedum stenopetalum
Saxifraga debilis
Saxifraga rhomboidea
Ribes inebrians
Ribes montigenum
Dasiphora fruticosa
Fragaria glauca
Potentilla glaucophylla
Rubus melanolasius
Sibbaldia procumbens
Geranium Richardsonii
Epilobium alpinum
Epilobium anagallidifolium
Arctostaphylos Uva-ursi
Androsace septentrionalis
Dodecatheon alpinum
Primula Parryi
Phlox caespitosa
Castilleja miniata
Castilleja rhexifolia
Castilleja viscida
Penstemon Whippleanus
Penstemon uintahensis
Lonicera involucrata
Sambucus microbotrys
Campanula petiolata
Arnica latifolia
Arnica mollis
Cirsium Eatoni
Erigeron leiomerus
Senecio triangularis
Solidago ciliosa

SIEVERSIA-CAREX ASSOCIATION (See Plate VI, Fig. 1.)

Above the timber line, which is at 11,000 feet, the broken, tumbled, lichen-covered rocks of the Alpine Zone permit very little vegetation. In small patches among the rocks, however, and at the margins of those few small lakes which do occur above the trees, there is sufficient soil to permit the development of small meadows, sometimes only a few feet in extent, which are dominated by *Sieversia turbinata* and several species of Carex. Dwarfed Engelmann's Spruce and

Alpine Fir may extend up into the lower limits of this zone, but are to be considered interlopers from an adjoining association. It is interesting to note that the species which were observed to occur at the highest altitude in the Uinta Mountains, all well above 12,000 feet, were *Festuca ovina brachyphylla*, *Campanula uniflora*, *Smelowskia linearilobа*, and *Polemonium viscosum*. The common species of the alpine Sieversia-Carex association are the following:

Cryptogramma acrostichoides
Woodsia scopulina
Selaginella Watsoni
Deschampsia caespitosa
Festuca ovina brachyphylla
Koeleria cristata
Trisetum spicatum
Carex albonigra
Carex bella
Carex capillaris
Carex ebenea
Carex Haydeniana
Carex phaeocephala
Carex Rossii
Eriophorum Scheuchzeri
Kobresia Bellardi
Juncus castaneus
Salix cascadensis
Salix petrophila
Salix planifolia
Eriogonum Porteri
Oxyria digyna
Polygonum viviparum
Arenaria Burkei
Paronychia pulvinata
Lychnis Drummondii
Lychnis Kingii
Silene acaulis subacaulescens
Parrya platycarpa
Smelowskia linearilobа
Dryas octopetala
Sieversia turbinata
Pseudocymopterus Hendersonii
Primula Parryi
Polemonium viscosum
Erytrichium elongatum
Mertensia ciliata
Penstemon uintahensis
Campanula uniflora
Actinea grandiflora
Artemisia Michauxiana
Artemisia scopulorum
Cirsium Eatoni
Chaenactis alpinus
Erigeron compositus multifidus
Erigeron leiomerus
Erigeron simplex
Senecio Purshianus
Solidago ciliosa

ANNOTATED LIST OF SPECIES

INTRODUCTION

In the following list only species substantiated by herbarium specimens are included. The specimens are in the Carnegie Museum Herbarium unless specifically stated otherwise, or unless the specimen is marked with a number preceded by the letters USFS, in which case it is to be found in the United States Forest Service Herbarium at Washington, D. C. Duplicates of the majority of the Carnegie Museum specimens may also be found in the Gray Herbarium, Harvard University, Cambridge, Massachusetts, the U. S. National Herbarium at Washington, D. C., the Herbarium of the Field Museum, Chicago, and the Herbarium of the Missouri Botanical Garden at St. Louis. In the present list only those specimens are cited which have been collected within the limits of the Uinta Basin as it is defined elsewhere (see page 24) in this work. A few numbers, however, which were collected by Carnegie Museum parties on the outward slopes of the Basin, are mentioned in discussion without complete citation.

The plan of treatment here has been to give the technical name of the plant followed by any well recognized or locally used common name or names and only those synonyms which are used in standard manuals and current treatments touching the area considered. Then follow two paragraphs, the first giving notes on distribution and frequency within the Basin and the flowering or fruiting condition of the specimens cited. There may also be other notes, such as particularly interesting geographical affinities of the species, its poisonous properties, and so on. The notes on poisonous properties have been taken primarily from Marsh (1929) and from Durrell and Glover (1931). The frequency noted is purely subjective, as no mathematical attempt was made to determine the exact number of plants in a given area. The terms common, frequent, infrequent, scarce, and rare have been used in an attempt to give a general conception of the abundance of the species within the Basin. Where distribution is noted as "throughout the Basin," reference is made, of course, to distribution within that association or altitudinal zone or zones to which that species is naturally limited. The meaning of low, mid- and upper altitudes is shown in Table 5, page 61. The second paragraph cites specimens, giving place, altitude, date and number.

More detailed information about the major localities is given on page 92. Unless otherwise noted, the locality is in Utah.

The arrangement of families is according to Diels (Engler's "Syllabus der Pflanzenfamilien," 11th Edition, 1936). The genera and species are arranged alphabetically for convenience in reference.

Acknowledgment of the help of specialists in various groups is given on page 7.

In order to supplement the information given in the citations, there is first given a "Summary of Collecting Data," followed by a somewhat detailed "Description of Major Collecting Localities."

SUMMARY OF COLLECTING DATA

A summary of collecting data, arranged chronologically, giving locality number, name of locality, date, and specimen numbers, is given immediately below. Plants collected en route from one major collecting site to another are not given a locality number, and for these, available data are given where the specimen is cited. For those localities which are numbered, detailed data are given in the "Description of Major Collecting Localities" starting on page 92, the numbers referring to those on the enfolded map (See Plate XIII).

1931

LOCALITY NUMBER	COLLECTING LOCALITY	DATE	SPECIMEN NUMBERS
1	West side of Green River near Quarry "L"	June 18	6072-6092
2	Between Green River and Quarry "L"..	June 19	6093-6125
2	Between Green River and Quarry "L"..	June 20	6126-6136
3	Flat above Quarry "L".....	June 20	6137-6171b
4	Flat between Ouray and Quarry "L"....	June 21	6172-6189a
1	West side of Green River near Quarry "L"	June 22	6190-6222
5	Ashley Creek near mouth of Dry Fork..	June 23	6223-6290
6	Along road south of Vernal (between Green River camp and Vernal).....	June 23	6291-6297
7	Davis Hollow, Taylor Mt.....	June 24	6298-6382b
8	Dry Fork, in Juniper Zone.....	June 26	6383-6403
8	Dry Fork, in Juniper Zone.....	June 27	6404-6408
9	Juniper Zone below Moon Lake.....	June 30	6409-6413
10	South of Moon Lake.....	June 30	6414-6467
11	West of Moon Lake.....	July 1	6468-6512
12	Creek north of Moon Lake.....	July 1	6513-6565
13	Brown Duck Lake.....	July 2	6566-6625a

LOCALITY NUMBER	COLLECTING LOCALITY	DATE	SPECIMEN NUMBERS
—	Between Brown Duck Lake and Moon Lake	July 2	6671
14	Slope above Brown Duck Lake	July 3	6626-6670
—	Miscellaneous	July 6-9	6672-6680
1	West Side of Green River near Quarry "L"	Aug. 29	7308-7321a
2	Between Green River and Quarry "L"	Aug. 30	7322-7340
1	West side of Green River near Quarry "L"	Aug. 30	7341-7360
3	Flat above Quarry "L"	Aug. 31	7361-7368
5	Ashley Creek near mouth of Dry Fork	Sept. 3	7369-7410
15	Along irrigation ditch west of Vernal	Sept. 4	7411-7439
8	Dry Fork, in Juniper Zone	Sept. 5	7440-7464
—	Upper Stanaker Draw, N. of Vernal	Sept. 7	7465-7466
7	Davis Hollow, Taylor Mt.	Sept. 7	7467-7495
	1933		
16	Five miles NW. of Dinosaur Quarry	April 24	7514-7521
16	Five miles NW. of Dinosaur Quarry	April 25	7522-7528
17	Nine miles SSE. of Jensen (Stewart's Locality)	April 27	7529-7541
18	Douglass Canyon, W. of Dinosaur Quarry	April 28	7542-7559b
19	Hills east of Dinosaur Quarry	April 29	7560-7577
56	Asphalt Ridge	May 1	7578-7580
20	Sand hills out Maeser road	May 2	7581-7596
6	Ten miles southwest (along road south) of Vernal	May 3	7597-7598
21	Flat southeast of Jensen	May 5	7599-7604
22	Skull Pass Quarry	May 5	7605-7613a, 7766
22	Skull Pass Quarry and along Green River west of Quarry	May 6	7614-7622b
22	Sandy Rabbitbrush flat, south of Skull Pass Quarry	May 7	7623-7625
22	Bad lands north of Skull Pass Quarry	May 9	7626-7649
23	Three miles west of Dinosaur Quarry	May 15	7650-7666
16	Five miles northwest of Dinosaur Quarry.	May 16	7667-7676
—	Along Brush Creek west of Dinosaur Quarry	May 16	7677-7682, 7765
19	Hills east of Dinosaur Quarry	May 17	7683-7709a
24	North of Dinosaur Quarry	May 18	7710-7724
18	Douglass Canyon, west of Dinosaur Quarry	May 19	7725-7735

LOCALITY NUMBER	COLLECTING LOCALITY	DATE	SPECIMEN NUMBERS
25	Between Dinosaur Quarry and Green River	May 19	7736-7746
26	Orchid (Mud) Springs Canyon	May 20	7747-7764
27	Cottonwood Springs, Little Mt.	May 22	7767-7790
28	Whiterocks Canyon	May 23	7791-7821a
22	Skull Pass Quarry	May 18	7822-7831a
—	Split Mt. Canyon	May 25	7831b-7831c
56	Asphalt Ridge	May 25	7832-7839
—	En route, Pariette Mine to mouth of Sand Wash	May 26	7840-7849
29	Pariette Mine, 10 mi. SE. of Myton	May 26	7850-7867
30	Talus slope, south of mouth of Sand Wash	May 27	7868-7899
31	Bench W. of Green River, north of mouth of Sand Wash	May 28	7900-7941a
32	Bench W. of Green River, south of mouth of Sand Wash	May 29	7942-7949
—	In base (mouth) of Sand Wash	May 29	7950
33	Vicinity of Desert Springs	May 30	7951-7955, 7958
34	Bench, head of Sand Wash	May 30	7956-7957
34	Bench, head of Sand Wash	May 30	7959-7968
35	Big (Uinta) Park, Uinta River Canyon	May 31	7969-8006
35	Big (Uinta) Park (and Aspen thickets adjoining), Uinta River Canyon	June 1	8007-8038
36	Along Uinta River east of Hayden	June 2	8039-8046
37	Junction of Juniper and Aspen Zones, Uinta River Canyon	June 2	8047-8063
35	Aspen-Pine Meadows, Uinta River Canyon	June 2	8064-8071
38	Near Spring, S. Slope of Diamond Mt.	June 5	8072-8079
39	N.-facing edge of Diamond Mt. plateau	June 5	8080-8085
40	Jackson Draw	June 6	8086-8115
—	Misc. en route Jackson Draw by way of Pot Creek road to Vernal-Manila road to Vernal	June 7	8116-8126
41	East slope of Wolf Creek Pass	June 16	8131-8150
—	Duchesne River Canyon	June 16	8269a
42	Vernal-Manila road north of Vernal	June 19	8151-8173
43	Creek Meadow, edge of Lodgepole forest, E. of Trout Creek R.S. (Oaks Park)	June 20	8174-8195
43	Meadow at Trout Creek R.S. (Windy Park)	June 20	8196-8203

LOCALITY NUMBER	COLLECTING LOCALITY	DATE	SPECIMEN NUMBERS
44	Trout Creek R.S. to Knob WNW. of Station	June 21	8204-8216
—	Camp (Lodgepole woods) at Trout Cr. R.S.	June 22	8216a-8217
45	Aspen thicket near Little Lake	June 22	8218-8232
—	Misc. en route Trout Cr. R.S. to Little Lake	June 22	8233-8235
45	Sagebrush below Aspens near Little Lake.	June 23	8236-8268
—	West side of Farm Creek	June 23	8269b
—	Near Brush Creek along Iron Springs road	June 23	8270-8276
46	Desert southeast of Jensen	June 27	8277-8305a
47	Pine Canyon, S. face of Book Cliffs and en route from Myton to Pine Canyon	June 28	8306-8339c, 8340
—	Along road N. of Rifle, W. of Grand Hogback	June 30	8339d-8339e
48	Southeast slope of Mosby Mt.	July 3	8341-8359
49	Meadow, east side of Paradise Park reservoir	July 4	8360-8375
49	Around lake east of Paradise Park	July 4	8376-8384
50	Blanchard Park, head of Dry Fork Creek	July 5	8385-8406
49	Near small lakes east of Paradise Park..	July 6	8407-8417
51	Ridge NNW. of Paradise Park	July 8	8418-8446
52	Marsh Peak, and en route from Paradise Park to Marsh Peak	July 10	8447-8456
—	Uinta River at sheep bridge	July 17	8456x
53	East slope of Mt. Emmons	July 18	8457-8474b
54	Between E. ridge of Mt. Emmons and Chain Lakes	July 19	8475-8500
54	Near camp in meadow, east of Mt. Emmons	July 19	8501-8514
54	Near camp in meadow, east of Mt. Emmons	July 20	8515-8521
54	Meadow along stream above Chain Lakes and on cliff above third Chain Lake ..	July 20	8522-8561b
54	Meadows above trees S. of E. ridge of Mt. Emmons	July 20	8562-8575
54	Around third Chain Lake and cliff above	July 21	8576-8591
54	West side of second and third Chain Lakes	July 22	8592-8606
36	Uinta River west of Lapoint	July 23	8607-8617
—	Uinta River, between U ranch and sheep bridge	July 23	8618-8622b

LOCALITY NUMBER	COLLECTING LOCALITY	DATE	SPECIMEN NUMBERS
—	W. side of Uinta River at sheep bridge	July 23	8623-8630
—	Between sheep bridge, Uinta River, and Chain Lakes	July 23	8631-8644
54	Small lake E. of first Chain Lake	July 23	8645-8649

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17	Nine miles SSE. of Vernal (Stewart's Locality)	May 2	8741-8753
1	West side of Green River near Quarry "L"	May 4	8754-8759
3	Flat above Quarry "L" (near Leota)	May 5	8760-8762
55	Box canyon on north side of White River, 4 mi. NE. of mouth of Evacuation Creek	May 6	8763-8770
55	Shale flat, north side of White River, 4 mi. NE. of mouth of Evacuation Creek	May 7	8771-8782
55	Along White River about 3 mi. above White River Station	May 8	8783-8784
55	Shale flat, N. side of White River, 4 mi. NE. of mouth of Evacuation Creek	May 8	8786-8790
—	Misc. along Ouray-Bonanza road	May 9	8791-8802
56	Vernal-Lapoint road W. of Asphalt Ridge	May 11	8803-8808
8	Dry Fork Creek just above Dry Fork town	May 12	8809-8817
57	Rocky S. slope of Leland Bench just N. of Leland Bench (labeled Pariette) Draw	May 13	8818-8840
57	Rocky S. slope of Leland Bench just N. of Leland Bench (labeled Pariette) Draw	May 14	8841-8854
57	Leland Bench just N. of Leland Bench (labeled Pariette) Draw	May 14	8855-8861a
—	Leland Bench SE. of Ft. Duchesne	May 15	8862
—	Near Uteland Mine	May 15	8863
58	SE.-facing rocky slope, W. side of Duchesne River about 4 mi. above Ouray	May 15	8864-8874
59	Bench W. of Green River, just S. of Uteland Butte	May 16	8875-8895a
59	West side of Green River at Uteland Mine	May 17	8896-8906a
—	Near mouth of Pariette Draw	May 18	8907
59	Along Green River, just S. of Uteland Mine	May 18	8908-8911

LOCALITY NUMBER	COLLECTING LOCALITY	DATE	SPECIMEN NUMBERS
6	Leota road near highway US 40 (along Vernal-Quarry "L" road S. of Vernal).	May 21	8912-8920
60	E. of Thorne's ranch (Willow Creek) 5 mi. N. of mouth of Agency Draw (West Bench).....	May 22	8921-8951
61	W. of Thorne's ranch (Willow Creek) 5 mi. N. of mouth of Agency Draw (Big Pack Mt.).....	May 23	8952-8967a
60	Draw E. of Willow Creek, near school house 5 mi. N. of mouth of Agency Draw.....	May 24	8968-8977
—	Misc. along Watson-Ouray road S. of Thorne's ranch.....	May 25	8978-8982a
62	5 mi. W. of Bitter Creek along Watson-Ouray road.....	May 26	8983-8998
—	Misc. en route Bitter Creek to Vernal by way of Watson on Watson-Vernal road	May 27	8999-9006
63	Marsh, mouth of Ashley Creek, W. side of Green River, 2 mi. S. of Jensen.....	May 30	9007-9028
—	10 mi. E. of Jensen along Highway US 40.	May 31	9029
64	South side of White River, 2 mi. SE. of mouth of Wolf Creek, NE. end of Cathedral Bluffs among Sagebrush and Junipers on rocky clay-loam slope....	May 31	9030-9051
64	S. side of White River, 2 mi. SE. of mouth of Wolf Creek, burned-over north slope of Calamity Ridge in Juniper-Pinyon Zone, NE. end of Cathedral Bluffs....	June 1	9052-9074a
64	S. side of White River, 2 mi. SE. of mouth of Wolf Creek from river to Juniper-Pinyon Zone.....	June 2	9075-9101b
—	Misc. along White River below and along Meeker-Maybell road N. of Meeker..	June 3	9102-9108
65	Head of Deep Channel Creek, about 2 mi. W. of Keystone ranch (W. of Price Creek town).....	June 4	9109-9126
—	Misc. en route Deep Channel Creek to Vernal by way of Youghall, Cross Mountain town, Blue Mt., and Jensen.	June 5	9127-9136
—	Misc. en route Vernal to Island Park....	June 8	9137-9139
66	Red Wash, just NW. of mouth of Whirlpool Canyon, above Island Park.....	June 10	9140-9184
67	East side of Green River, Island Park, to W. base of Blue Mt.....	June 11	9185-9202a

LOCALITY NUMBER	COLLECTING LOCALITY	DATE	SPECIMEN NUMBERS
—	Misc. near Brush Creek along Vernal-Island Park road	June 12	9203-9209
—	Misc. along highway US 40 west out of the Basin	June 13	9212-9217
68	Head of Horse Creek, SW. of Strawberry reservoir	June 17	9218-9229
—	West slope of Basin W. of head of Horse Creek	June 17	9230-9232
68	Horse Creek, SW. of Strawberry reservoir.	June 18	9233-9269
—	Misc. from Horse Creek to Duchesne by way of the Narrows, Soldier Springs, Fruitland, Red Creek and Strawberry River	June 19	9270-9291
—	E. Side of West Fork Creek above mouth of East Fork (Yellowstone) below Moon Lake	June 22	9292-9295
36	Uinta River along Lapoint-Neola road	June 22	9296-9304, 9312-9313
—	Desert about 5 mi. east of Lapoint	June 22	9305-9311
11	SW. of Moon Lake, in Sagebrush and aspen-pine woods	June 23	9314-9341
11	SW. of Moon Lake, in open, wet grassy meadow	June 24	9342-9360
—	Misc. along road from Moon Lake to Red Creek by way of Mountain Home and Tabiona	June 25	9361-9369
69	Low ridge below Moon Lake, S. of mouth of Creek entering West Fork from the northeast	June 25	9370-9390
70	Aspen-filled valley entering Red Creek from the east	June 26	9391-9415
71	Along road above camp, (east side of) Red Creek	June 26	9416-9435
71	West side of Red Creek above camp	June 27	9436-9454
—	Misc. en route, Indian Canyon from Duchesne to Mud Springs	June 28	9455-9460
72	Below (north of) Mud Springs, about 2 mi. W. of Indian Canyon Pass and 10 mi. NE. of Castlegate	June 29	9461-9497
—	Misc. en route, Myton to Cottonwood Creek (S. tributary of Minnie Maud)	July 5	9498-9507
73	Cottonwood Creek (S. tributary of Minnie Maud) and dugway leading south out of Cottonwood Creek	July 6	9508-9519

LOCALITY NUMBER	COLLECTING LOCALITY	DATE	SPECIMEN NUMBERS
73	Cottonwood Creek (S. tributary of Minnie Maud)	July 7	9520-9526
—	Misc. en route, Cottonwood Creek to Sunnyside by way of Minnie Maud Creek and Soldier Creek	July 8	9527-9530
74	Willow Springs, 10 mi. E. of Sunnyside and meadow pasture NW. of Willow Springs	July 10	9531-9579
75	Aspen and Fir woods and Sagebrush along Rock Creek below Willow Springs	July 11	9580-9614a
74	Along rim of Basin, east of Range Creek valley, near Willow Springs	July 12	9615-9623a
74	Along rim of Basin, east of Range Creek valley, near Willow Springs	July 13	9624-9627, 9641-9642
—	Misc. en route, along horse trail, Willow Springs to Sunnyside by way of NE. slope of Water Canyon	July 14	9628-9638
—	Willow Creek south of Indian Canyon Pass	July 14	9639-9640
76	Canyon at head of West Fork of Douglas Creek	July 16	9643-9703
—	Head of East Salt Creek	July 16	9704-9707
—	Misc. along upper Piceance Creek from Rio Blanco to 5-10 mi. below it	July 17	9708-9714
77	Upper Middle Fork of Stuart Creek (and Basin rim at head of)	July 18	9715-9744
77	E.-facing open shale slope of upper Middle Fork of Stuart Creek	July 18	9745-9764a
—	Desert N. of Rangely, in Raven Park	July 19	9765-9766
78	Middle Fork of Stuart Creek (below camp)	July 19	9767-9778a
63	Marsh, mouth of Ashley Creek	July 23	9779-9820
—	Misc. en route Ouray to Post Canyon by way of Hill Creek and Horse Corn (Fortification) Creek	July 26	9821-9825
79	Sagebrush-covered (some oak) ridge W. of head of Post Canyon	July 27	9826-9855
79	Along stream and Aspen woods below spring, Post Canyon	July 28	9856-9900b
79	Along road, Post Canyon and on ridge between Post and Florence Canyons	July 29	9901-9933a
80	(Head of Hill Creek) Post Canyon to Basin rim N. of head of Flat Nose Canyon	July 31	9934-9951

LOCALITY NUMBER	COLLECTING LOCALITY	DATE	SPECIMEN NUMBERS
81	Florence Canyon, from head to mouth on Green River	Aug. 1	9952-9964
81	Along Green River from mouth of Florence Canyon to mouth of Chandler Canyon	Aug. 2	9965-9972
82	Chandler Canyon, from mouth on Green River to head	Aug. 2	9973-9975
82	Chandler Canyon, from mouth on Green River to head	Aug. 3	9976-9981
—	Misc. en route Thorne's ranch (Willow Creek) to Ouray	Aug. 5	9982-9986
—	In gardens at Lapoint	Aug. 8	9987-9988
83	Brush Creek Gorge	Aug. 11	9989-10021
8	On cliff side near Dry Fork	Aug. 12	10022
49	Woods and small lakes NE. of Paradise Park	Aug. 16	10023-10046
49	Along creek in meadow below Paradise Park reservoir (dam)	Aug. 16	10047-10057
—	Lodgepole Pine woods and rocky bluff in E. rim of Whiterocks Canyon between Red Pine and Paradise Creeks	Aug. 17	10058-10069
—	On Weber quartzite along Paradise Park road, base of Mosby Mt.	Aug. 18	10070
84	Meadow, S. edge of Chepeta Lake	Aug. 20	10071-10079
81	Lodgepole-Spruce woods between Paradise Park and Chepeta Lake	Aug. 20	10080-10093
81	Around Chepeta Lake	Aug. 21	10094-10109
85	Head of West Fork of Whiterocks River.	Aug. 21	10110-10131a
86	Queant Lake S. along W. Fork of Whiterocks River trail	Aug. 22	10132-10138
—	Misc. en route, along Jensen-Dragon road	Aug. 27	10139-10143
—	Greasewood flat of Evacuation Creek, 3 mi. S. of Dragon and canyon W. of Dragon	Aug. 28	10144-10148
87	Sub-montane Shrub (chaparral) and aspen-fir woods one mile W. of Baxter Pass	Aug. 29	10149-10166
88	Bitter Creek, about 3 mi. E. of Utah-Colorado state line	Aug. 30	10167-10177
—	Misc. along Dragon-Rangely road	Aug. 31	10178-10183
—	Misc. along Vernal-Manila road and at Dyer Mine	Sept. 4	10184-10194
—	Green Lakes	Sept. 5	10195-10197
—	5 mi. S. of Mountain View, Wyoming	Sept. 6	10198

LOCALITY NUMBER	COLLECTING LOCALITY	DATE	SPECIMEN NUMBERS
89	Wet meadows, stony areas and woods surrounding Mirror Lake	Sept. 7	10199-10251
—	Misc. en route Mirror Lake to Duchesne by way of Wolf Creek Pass	Sept. 8	10252-10258
3	Flat above Quarry "L"	Sept. 11	10259, 10264-10271
1	W. Side of Green River near Quarry "L".	Sept. 11	10260-10263
—	Yard, Vernal	July	10272

DESCRIPTION OF MAJOR COLLECTING LOCALITIES

The eighty-nine major collecting localities visited are listed below by number, as given on the enfolded map (Plate XIII) and in the "Summary of Collecting Data" above, and also by name, as given in the citation of specimens. An attempt has been made to give the plant association, underlying geological formation, altitude, county, numbers collected at that locality, and other known pertinent information for each of the major collecting sites visited. The locality numbers are chronologically as well as numerically arranged, and the specimen numbers, which are given last, are consequently numerically arranged except where a locality was re-visited at a later date, in which case one or more sets of specimen numbers are unavoidably out of order. If one wishes to obtain the detailed description of the locality at which a given number was collected, however, that is obtained by reference to the above "Summary of Collecting Data" where, by finding the number of the specimen, one can thereby find the number of the locality at which it was collected, and so refer to the description of the locality in the following numbered list.

1. West side of Green River near Quarry "L"—The paleontological Quarry "L" (for Leota) is in the clay-shale bad lands bluffs on the west (north, at this point where the river swings east) side of Green River about 20 miles south of Vernal and 5 miles above Ouray. The Green River near the quarry has a broad, Cottonwood-covered flood-plain. River alluvium over Uinta Eocene. Elev. 4700 ft. Uintah County. Nos. 6072-6092, 6190-6222, 7308-7321a, 7341-7360, 8754-8759, 10260-10263.

2. Between Green River and Quarry "L"—Greasewood-Shadscale river lowland between the Cottonwoods of the immediate river flood-

plain and the bad lands of the quarry bluff (see Loc. 1). Clay-shale outwash and river alluvium over Uinta Eocene. Elev. 4700 ft. Uintah County. Nos. 6093-6136, 7322-7340.

3. Flat above Quarry "L"—Sandy Rabbitbrush (*Chrysothamnus stenophyllus*) bench above and west of Quarry "L" (see Loc. 1) on the east edge of a small plateau labeled "Colorado Park" on the Vernal topographic quadrangle but locally known as "Leota Bench." Horizon "C," Uinta Eocene. Elev. 4800 ft. Uintah County. Nos. 6137-6171b, 7361-7368, 8760-8762, 10259, 10264-10271.

4. Flat between Ouray and Quarry "L"—Green River lowland of Greasewood-Shadscale and Cottonwood flood-plain between Quarry "L" and Ouray (see Loc. 1). River alluvium over Uinta Eocene. Elev. 4700 ft. Uintah County. Nos. 6172-6189a.

5. Ashley Creek near mouth of Dry Fork—About one mile above the junction of the two streams, on the west side of Ashley Creek, in the more or less mesophytic habitat of the tree-lined stream bank and the environs of an irrigated alfalfa field. Triassic sandstone and shale red-beds. Elev. 6000 ft. Uintah County. Nos. 6223-6290, 7369-7410.

6. Along road south of Vernal—Mostly Rabbitbrush and Atriplex-Tetradymia desert between Green River at Quarry "L" (see Loc. 1) and Vernal, via Leota Bench (see Loc. 3) road and highway US 40. Some, so labeled, were collected along "Leota road near highway US 40." Duchesne River Oligocene sandstone and shale. Elev. c. 5000 ft. Uintah County. Nos. 6291-6297, 7597-7598, 8912-8920.

7. Davis Hollow, Taylor Mountain—About 15 miles north of Vernal just west of the place marked "Dodds Cabin" on the Marsh Peak topographic quadrangle, in the Uinta Mountains. Most of the plants were collected in aspen-pine woodland and open meadows at approximately 8500-8700 feet but a few were actually collected south of this locality at lower altitudes (followed by a question mark in citation) along the Taylor Mountain road east of Ashley Creek. Carboniferous. Uintah County. Nos. 6298-6382b, 7467-7495.

8. Dry Fork, (in Juniper Zone)—On the south side of Dry Fork Creek near Dry Fork town, on the north slope of Little Mountain in upper Juniper-Pinyon Zone. Triassic. Elev. 7000 ft. Uintah County. Nos. 6383-6408, 7440-7464, 8809-8817, 10022.

9. Juniper Zone below Moon Lake—Along the road between Boneta and Moon Lake, at an approximate altitude of 7500 feet, in

upper Juniper-Pinyon and lower Sub-montane Shrub Zones, Uinta Mountains. Glacial drift overlying Duchesne River Oligocene. Duchesne County. Nos. 6409-6413.

10. South of Moon Lake—In open Sagebrush (*Artemisia cana*) flat and adjoining aspen-pine woods within one mile south of Moon Lake (previous to its conversion into a reservoir lake) on the west side of West Fork (of Lake Fork) Creek, Uinta Mountains. Glacial moraine over Mississippian limestone. Elev. 8100 ft. Duchesne County. Nos. 6414-6467.

11. West and southwest of Moon Lake—In wet meadows and mixed aspen-pine woods within one mile west and southwest of Moon Lake and along Brown Duck Creek, Uinta Mountains. The soil among a patch of Bracken Fern under Aspens here showed a pH value of about 7. Glacial moraine over Mississippian limestone. Elev. 8100 ft. Duchesne County. Nos. 6468-6512, 9314-9360.

12. Creek north of Moon Lake—Up West Fork (of Lake Fork) Creek within two miles north of Moon Lake, Uinta Mountains, in country similar to Loc. 11, q. v. Pre-Cambrian quartzite. Elev. 8200 ft. Duchesne County. Nos. 6513-6565.

13. Brown Duck Lake—In wet meadow and Lodgepole Pine-Engelmann's Spruce woods around the lake, Uinta Mountains (see Hayden Peak topographic quadrangle). Pre-Cambrian quartzite. Elev. 10,400 ft. Duchesne County. Nos. 6566-6625a.

14. Slope above Brown Duck Lake—Steep rocky ridge south of Brown Duck Lake both above and below the timber line, Uinta Mountains. Pre-Cambrian quartzite. Elev. 11,000 ft. Duchesne County. Nos. 6626-6670.

15. Along irrigation ditch west of Vernal—Within the confines of an area surrounded by cultivation. Cretaceous marine shale. Elev. 5300 ft. Uintah County. Nos. 7411-7439.

16. Five miles northwest of Dinosaur Quarry—The Dinosaur Quarry, where the Carnegie Museum for years explored the rocks for dinosaurs, is on the north side of the Green River a few miles above Jensen, just east of Dinosaur (Bug) Gulch (see Loc. 18) within the area which became the Dinosaur National Monument in 1915 (proposed National Park). Five miles northwest of the Quarry is in upper Mixed Desert Shrub Zone with a few Junipers on the outcropping ridges. It is just east of Brush Creek and southeast of DeJournette's ranch. The pH of the surface soil, taken in several spots near this

locality, showed a value of about 7.5. Jurassic sandstone and shale. Elev. 5500 ft. Uintah County. Nos. 7514-7528, 7667-7676.

17. Nine miles south southeast of Vernal—Atriplex-Tetradymia and Mat Atriplex desert north (west) of the Green River and about five miles below the mouth of Ashley Creek, along the old Vernal-Dragon road (ferry there marked on the Jensen topographic quadrangle is no longer in existence). This area is also referred to in notes as "Stewart's Locality." A few specimens, so marked, were collected along the Green River below Jensen. Cretaceous shale. Elev. 5000 ft. Uintah County. Nos. 7529-7541, 8741-8753.

18. Douglass Canyon, west of Dinosaur Quarry—This draw or gulch was named for Earl Douglass, who discovered dinosaur remains in this vicinity in 1908 and who lived for a time in a cabin at the mouth of the draw. It is one of a series of gulches draining into the Green River from the north between Brush Creek and where the river cuts through Split Mountain Canyon (see Loc. 23). It is west of Dinosaur (Bug) Gulch, on the east side of which the Dinosaur Quarry is situated, and it (Douglass Canyon) is known locally as Ainge Gulch. A few specimens, so labeled, were collected at the quarry itself. It is in lower Juniper-Pinyon and upper Mixed Desert Shrub Zones. Jurassic. Elev. 5000 ft. Uintah County. Nos. 7542-7559b, 7725-7735.

19. Hills east of Dinosaur Quarry—In lower Juniper-Pinyon and upper Mixed Desert Shrub Zones. Jurassic. Elev. 5000 ft. Uintah County. Nos 7560-7577, 7683-7709a.

20. Sand hills out Maeser road—Lower Juniper-Pinyon Zone north of Maeser school (north Vernal) about four miles northwest of Vernal, north of Ashley Creek. Lower Cretaceous fresh-water sandstone and upper Jurassic. Elev. c. 6000 ft. Uintah County. Nos. 7581-7596.

21. Flat southeast of Jensen—Sandy bench near the place marked "Rim Rock" on the Jensen topographic quadrangle along the Jensen-Bonanza (Vernal-Dragon) road. It is upper Mixed Desert Shrub and lower Juniper-Pinyon Zones. Cretaceous below along river; Duchesne River Oligocene on flat above. Elev. 5000 ft. Uintah County. Nos. 7599-7604.

22. Skull Pass Quarry—A paleontological quarry (also known as the Thorne quarry) in clay-shale bad lands about five miles east of Green River and of Quarry "L" (see Loc. 1). Collections were made

at the quarry and, where so noted, "along river, W. of," "sandy flat S. of," and "bad lands N. of" Skull Pass Quarry. The clay-shale of these bad lands showed a pH value of 7.5. It is mostly in Horizon "C," Uinta Eocene formation with Duchesne Oligocene exposed on the uppermost bad lands north of the quarry. Elev. 5000 ft. Uintah County. Nos. 7605-7613a, 7614-7649, 7766, 7822-7831a.

23. Three miles west of Dinosaur Quarry—Slightly southeast of Loc. 16 (q.v.) in a draw known as "Paddy's Gap" or "Paddy's Wash," another in that series of draws which drains into the Green River from the north between Brush Creek and where the river comes through Split Mountain canyon, of which, from west to east, Orchid (Mud) Springs Canyon (see Loc. 26), Douglass Canyon (see Loc. 18), and Dinosaur (Bug) Gulch (see Loc. 18), are others. Upper Mixed Desert Shrub and lower Juniper-Pinyon Zones. Jurassic. Elev. 5500 ft. Uintah County. Nos. 7650-7666.

24. North of Dinosaur Quarry—More or less sandy hills in Juniper-Pinyon Zone. The pH of the soil near the quarry was 7.5. Triassic. Elev. 5500 ft. Uintah County. Nos. 7710-7724.

25. Between Dinosaur Quarry and Green River—A Greasewood flat. Marine Cretaceous. Elev. 4800 ft. Uintah County. Nos. 7736-7746.

26. Orchid (Mud) Springs Canyon—Gulch in lower Juniper-Pinyon and upper Mixed Desert Shrub Zones immediately west of Douglass (Ainge) Canyon (see Loc. 18). This locality should not be confused with the Mud Springs (Loc. 72) north of Castlegate. Jurassic. Elev. 5000 ft. Uintah County. Nos. 7747-7764.

27. Cottonwood Springs, Little Mountain—Eight miles due west of Vernal (see Vernal topographic quadrangle) in well developed Juniper-Pinyon Zone. Collections were made primarily in the open valley about one mile above the springs proper. Glacial drift over Duchesne River Oligocene. Elev. 6600 ft. Uintah County. Nos. 7767-7790.

28. Whiterocks Canyon—Along the east side of Whiterocks River about eight miles north of the town of Whiterocks between Red Pine Canyon and Paradise Creek, Uinta Mountains. The canyon bottom is largely Sagebrush with some Yellow Pine. There are a few Aspens along the river and Douglas Fir occurs on the upper valley slopes and in the side canyons. Glacial drift along the river over Carboniferous. Elev. c. 7300 ft. Uintah County. Nos. 7791-7821a.

29. Pariette Mine, 10 miles southeast of Myton—In rather extreme *Kochia vestita* desert on a plateau locally called Pariette Bench, in the upper Pariette Creek drainage. The mine is for gilsonite. The pH of surface soil of Pariette Bench was 7.5. Horizon "B," Uinta Eocene. Elev. 5000 ft. Duchesne County. Nos. 7840-7867. Nos. 7840-7849 were collected en route from Pariette Mine to Sand Wash on Horizon "A," Uinta Eocene, or on Green River shale.

30. Talus slope, south of mouth of Sand Wash—Sand Wash is the first major canyon and drainageway north of Minnie Maud Creek which enters the Green River from the west in upper Desolation Canyon. All the collections at this and the two following localities were made on the west side of the Green River. The rocky talus is mostly Shadscale, grading into Greasewood flats below and Cottonwoods along the river banks. A few specimens were collected along the river. The soil on the talus, on the Greasewood flat below, under the Cottonwoods on the river flood-plain, and the river water itself, all gave pH values of about 7.5. Green River Eocene shale. Elev. 4500 ft. Uintah County. Nos. 7868-7899.

31. Bench west of Green River, north of mouth of Sand Wash—Shadscale bench. The specimens collected here are labeled with the elevation of 4500 feet, but the bench must be two or three hundred feet higher than this for the river is probably 4500 feet at this point. Green River Eocene shale. Uintah County. Nos. 7900-7941a.

32. Bench west of Green River, south of mouth of Sand Wash—Shadscale bench somewhat higher than the bench (see Loc. 31) north of the canyon's mouth. Green River Eocene shale. Elev. 5000 ft. Uintah County. Nos. 7942-7949.

33. Vicinity of Desert Springs—Atriplex-Tetradymia bench north of the head of Sand Wash (see Loc. 30) along lower desert road to Myton. The locality is practically on the Duchesne-Uintah County line. Lower Horizon "A" of Uinta Eocene. Elev. c. 5500 ft. Nos. 7951-7955, 7958.

34. Bench, head of Sand Wash—Atriplex-Tetradymia bench at head of Sand Wash (see Loc. 30). Green River Eocene shale. Elev. c. 5300 ft. Southeastern corner of Duchesne County. Nos. 7956-7957, 7959-7968.

35. Big (or Uinta) Park, Uinta River Canyon—Along the Uinta River about eight miles above the mouth of Pole (Farm) Creek, Uinta Mountains. The valley floor is rather flat and covered by a

fine stand of Yellow Pine with scattered Aspens and some open Sagebrush areas. Some of the specimens, so labeled, were collected up the valley above the park, or in the meadows. The pH of the sandy soil under the pines was 6+. The sheep bridge is a few miles above the park, the U ranch just a few hundred yards above it. Glacial drift over Carboniferous; Uinta quartzite above the sheep bridge. Elev. 7500 ft. Duchesne County. Nos. 7969-8038, 8064-8071.

36. Uinta River—Along Lapoint-Neola road on the Uinta River flood-plain where the stream braids out over glacial morainic rocks east of Hayden and west of Lapoint. Elev. 5500-5700 ft. Uintah County. Nos. 8039-8046, 8607-8617, 9296-9304, 9312-9313.

37. Junction of Juniper and Aspen Zones, Uinta River Canyon—Mostly in the connecting Sub-montane Shrub Zone in open country before the canyon narrows above, Uinta Mountains. Below Loc. 35. Glacial drift over Duchesne River Oligocene. Elev. 7000 ft. Duchesne County. Nos. 8047-8063.

38. South slope of Diamond Mountain—Along the Vernal-Diamond Mt. road near a spring in Sub-montane Shrub surrounded by a patch of Aspens at an elevation of approximately 6000 ft. Lower Jurassic. Uintah County. Nos. 8072-8079.

39. North-facing edge of (south slope of) Diamond Mountain—Along the Vernal-Diamond Mt. road above spring (Loc. 38) where the grassy plateau breaks off into a small valley on the north. It is, however, on the south rim of the plateau, just as the road reaches the rim. Carboniferous. Elev. c. 6500 ft. Uintah County. Nos. 8080-8085.

40. Jackson Draw—A narrow rocky canyon outside of the Basin (like Loc. 47) on the northern slope of the north Basin rim. The canyon sides are covered with a fine example of the Juniper-Pinyon Zone with willows, Box Elder and dogwood along the stream. There is an old road, now impassable to automobiles, down the canyon. The pH of the soil under the Pinyons here was about 7.5. On the Ashley reconnaissance sheet this draw is called "Summit Creek" and on the U.S.G.S. Utah State base map it is marked "Kettle Creek." Pre-Cambrian quartzite. Elev. c. 7000 ft. Daggett County. Nos. 8086-8115.

41. East slope of Wolf Creek Pass—The pass divides Wolf Creek, a north spur of the West Fork of the Duchesne River, western Uinta Mountains, from the South Fork of the Provo River. The pass is

at 9408 feet; our collections are largely from the pass along upper Wolf Creek on the east slope to about 9000 feet. Carboniferous. Wasatch County. Nos. 8131-8150.

42. Vernal-Manila road north of Vernal—Along the road in Juniper-Pinyon, Sub-montane Shrub and Aspen Zones, mostly among Junipers, below the junction with the Iron Springs road to the west. Carboniferous, with Permian on the slope before the road flattens out. Elev. 6500 ft. or higher, as noted. Uintah County. Nos. 8151-8173.

43. Trout Creek Ranger Station—Head of Big Brush Creek, Uinta Mountains. The collections were made in meadows of Windy and Oaks Parks (see Marsh Peak topographic quadrangle) at the edge of Lodgepole Pine forest. The soil under the Lodgepole Pine needle cover here showed a pH value of 6–. Pre-Cambrian quartzite. Elev. 9300 ft. Uintah County. Nos. 8174-8195 (Oaks Park), 8196-8203 (Windy Park).

44. West northwest of Trout Creek Ranger Station—Between the station (see Loc. 43) and a distinct but un-named knob or peak at 10,600 feet which is about two miles east of Trout Peak. Pre-Cambrian quartzite. Uintah County. Nos. 8204-8216.

45. Near Little Lake—A small lake just southwest of the junction of the Iron Springs and Vernal-Manila roads, Uinta Mountains. It is in a large grassy meadow surrounded by Aspens. To the south, below the lake, there is open Sagebrush of the Sub-montane Shrub Zone. The pH of the soil under the Aspens here was 7. Carboniferous, with glacial moraine in lowermost Sagebrush area. Elev. 8500 ft. Uintah County. Nos. 8218-8232, 8236-8268.

46. Desert southeast of Jensen—Along Jensen-Bonanza (Vernal-Dragon) road between Jensen and the paleontological Quarry "G." It is in upper Mixed Desert Shrub Zone with a few rather small Junipers on the topmost benches. The quarry is in Horizon "C," Uinta Eocene; the benches are Duchesne River Oligocene. Elev. 5500 ft. Uintah County. Nos 8277-8305a.

47. Pine Canyon—An east tributary of upper Soldier Creek, on the south slope of the Book Cliffs. This locality (like Loc. 40) is not within the Basin but is on the south slope of its southern rim. It is a shallow valley with mixed Sagebrush, Aspen and Douglas Fir. Some of the specimens, so labeled, were collected en route from Myton to Pine Canyon. Wasatch formation. Elev. c. 7500 ft. Carbon County. Nos. 8306-8339c, 8340.

48. Southeast slope of Mosby Mountain—Along the Lapoint-Paradise Park road in Sub-montane Shrub and Aspen Zones, Uinta Mountains. Carboniferous. Elev. 8000 ft. Uintah County. Nos. 8341-8359.

49. Paradise Park—A reservoir lake in the Uinta Mountains surrounded by meadow and mixed Lodgepole Pine-Spruce forest at the head of Paradise Park Creek (see Marsh Peak topographic quadrangle). Some of the specimens are referred to "meadow below," "meadow east of," "small lakes east of," and "lodgepole woods and small lakes northeast of" Paradise Park. The soils of both the dry and wet meadows and the sedge-mat edge of a small lake here showed a pH value of about 6. Pre-Cambrian quartzite. Elev. 10,000-10,200 ft. Uintah County. Nos. 8360-8384, 8407-8417, 10023-10057.

50. Blanchard Park, head of Dry Fork Creek—Meadow and mixed Lodgepole Pine-Spruce woods in the Uinta Mountains about one mile west of Twin Lakes (see Marsh Peak topographic quadrangle). On the U. S. Forest Service maps it is called "Blanchett Park." The pH of the grassy stream bank of Dry Fork Creek here where *Kalmia microphylla* was growing showed a value of 6. Pre-Cambrian quartzite. Elev. 10,000 ft. Uintah County. Nos. 8385-8406.

51. Ridge north northwest of Paradise Park—Rocky ridge of the Alpine Zone in the Uinta Mountains two miles north northwest of Paradise Park, with collections made from 10,500 to 11,500 feet, the latter elevation being the crest of the ridge and well above the trees. The scarce soil of the meadow patches among the rocks showed a pH value of about 7. Pre-Cambrian quartzite. Uintah County. Nos. 8418-8446.

52. Marsh Peak—Collections were made and so labeled, along the trail through Lodgepole Pine and Engelmann's Spruce forest from Paradise Park (see Loc. 49) across Dry Fork to Marsh Peak, in the Uinta Mountains and on the bench near timber line on the southwest slope of the peak. Pre-Cambrian quartzite. Elev. 11,000 ft. Uintah County. Nos. 8447-8456.

53. East slope of Mount Emmons—Treeless rocky east face of the peak from its summit to the ridge running east northeast of it, in the Uinta Mountains. Pre-Cambrian quartzite. Elev. 11,500-13,455 feet (the latter altitude being that given on the bench mark on top of Mt. Emmons). Duchesne County. Nos. 8457-8474b.

54. Between east ridge of Mount Emmons and Chain Lakes—The Chain Lakes are four lakes about three miles east of Mount Emmons on a north fork of Krebs Creek (upper Uinta River), situated at various elevations, and referred to as the first, second, third and fourth Chain Lakes, the lowermost being the first. The Gilbert Peak topographic quadrangle does not show the uppermost or the fourth, which is the smallest, at about timber line at 11,000 feet. Our camp was at 11,300 feet, north of the fourth Chain Lake and south of ridge running east northeast of Mount Emmons (see Loc. 53) in an alpine meadow where a few patches of trees persisted. Above this was uninterrupted Alpine Zone, with patches of meadow, a few tiny lakes, rocky summits and patches of snow on protected north slopes. Pre-Cambrian quartzite. Duchesne County. Nos. 8475-8606, 8645-8649.

55. North side of White River, four miles northeast of mouth of Evacuation Creek—Atriplex-Tetradymia desert flat and in upper box canyon leading to the river. Nos. 8783 and 8784 were collected along the river. Green River Eocene shale. Elev. 5200-5300 ft. Uintah County. Nos. 8763-8790.

56. Asphalt Ridge—Collections were made on the east (Cretaceous) side of the ridge and along the Vernal-Lapoint road west (Duchesne River Oligocene) of the ridge, both in lower Juniper-Pinyon Zone. The ridge is about five miles south southwest of Vernal. Lapoint is marked "Taft" on the Vernal topographic quadrangle. Elev. 5800 ft. Uintah County. Nos. 7578-7580, 7832-7839, 8803-8808.

57. South slope of Leland Bench—On top of the bench and on the rubble-like slope just north of Leland Bench Draw (labeled Pariette Draw on specimens). It is *Kochia vestita* desert. Horizon "B," Uinta Eocene. Elev. 5000 ft. Uintah County. Nos. 8818-8861a.

58. Rocky slope, west side of Duchesne River, 4 miles above Ouray—Shadscale desert on a southeast-facing rubble-like slope. Horizon "C," Uinta Eocene. Elev. 4800 ft. Uintah County. Nos. 8864-8874.

59. Bench west of Green River, south of Uteland Butte—Sandy Rabbitbrush flats and rubble-like desert slopes. (See Vernal topographic quadrangle). Some of the specimens are labeled "rocky bench, Uteland Mine" while some, so labeled, were collected along the river flood-plain. Horizon "B," Uinta Eocene. Elev. 4800 ft. Uintah County. Nos. 8875-8906a, 8908-8911.

60. East of Willow Creek, Thorne's ranch—West side of West Bench, about five miles north of the mouth of Agency Draw. Shadscale desert. Some of the specimens (Nos. 8968-8977) were collected near a school house, in a draw near the creek just above Thorne's ranch at 5300 feet. Green River Eocene shale, with top of bench Horizon "A," Uinta Eocene. Elev. 5500-5800 ft. Uintah County. Nos. 8921-8951, 8968-8977.

61. West of Willow Creek, Thorne's ranch—East slope of Big Pack Mountain (bench) about five miles north of the mouth of Agency Draw. Shadscale desert. Green River Eocene shale. Elev. 5400 ft. Uintah County. Nos. 8952-8967a.

62. Five miles west of Bitter Creek along the Watson-Ouray road —On a treeless Green River shale knoll surrounded by upper Mixed Desert Shrub and patches of Utah Juniper and Pinyon Pine. Elev. 6300 ft. Uintah County. Nos. 8983-8998.

63. Marsh, mouth of Ashley Creek—Two miles southwest of Jensen, west side of Green River. A Typha-Scirpus swamp (before its creation into the proposed Ashley Lake as a water fowl refuge) and Greasewood flat above. River alluvium over Cretaceous marine deposits. Elev. 4700-4800 ft. Uintah County. Nos. 9007-9028, 9779-9820.

64. South side of White River, two miles southeast of mouth of Wolf Creek, Colo.—Between Shadscale desert along the river to Sagebrush and Juniper-Pinyon on the north-facing burned-over slope of Calamity Ridge at the northeast end of Cathedral Bluffs, above the mouth of Yellow Creek (see White River topographic quadrangle). Green River Eocene. Elev. 5500-6700 ft. Rio Blanco County, Colo. Nos. 9030-9101b.

65. Head of Deep Channel Creek, Colo.—Among Utah Juniper and Pinyon Pine and Sagebrush, about two miles west of Keystone ranch, which is west of Price Creek, Keystone Basin (see White River topographic quadrangle). Mesa Verde Upper Cretaceous fresh water formation. Elev. 6400 ft. Moffat (previously Routt) County, Colo. Nos. 9109-9126.

66. Red Wash, above Island Park—A small draw just northwest of the mouth of Whirlpool Canyon (locally miscalled Split Mountain Canyon). Upper Mixed Desert Shrub and lower Juniper-Pinyon Zones. Carboniferous. Elev. 5000-5300 ft. Uintah County. Nos. 9140-9184.

67. East side of Green River, Island Park—Across the river from Locality 66. The collections were made between the river and the base of Blue Mountain, where, in the shelter of the high cliffs, a clump of Douglas Firs and associated species thrives within a short distance of Sagebrush desert. Carboniferous. Elev. 4950-5300 ft. Uintah County. Nos. 9185-9202a.

68. (Head of) Horse Creek—Southwest of Strawberry reservoir in the west end of the Basin, in clumps of Aspen with a few scattered Alpine Firs and open Sagebrush areas. Green River Eocene. Elev. 7800 ft. Wasatch County. Nos. 9218-9229, 9233-9269.

69. Low ridge below Moon Lake—Ridge south of mouth of creek entering West Fork (of Lake Fork) Creek from the northeast just below Moon Lake, Uinta Mountains. A wooded spot, with a peculiar mixture of upper forest and low altitude trees. A few specimens were collected along the narrow flood-plain there. Terminal glacial moraine. Elev. 8000 ft. Duchesne County. Nos. 9370-9390.

70. East tributary of Red Creek—An Aspen-filled valley in the west end of the Basin at the mouth of which we camped. Camp was on Red Creek below a coal mine (Cretaceous) on the other (west) side of the creek. Red Creek valley is clothed with a mixture of Sub-montane Shrub, Aspen, and oak, with Blue Spruce along the stream. Lower Duchesne River Oligocene. Elev. 7500 ft. Western Duchesne County. Nos. 9391-9415.

71. Red Creek—Along road on the east side of the valley near camp (see Loc. 70) with some specimens collected on the west side of Red Creek. Lower Duchesne Oligocene. Elev. 7500 ft. Western Duchesne County. Nos. 9416-9454.

72. Below Mud Springs—North of Mud Springs on the Tavaputs Plateau, along the southwest rim of the Basin about two miles west of Indian Canyon Pass and ten miles northeast of Castlegate at the head of Avintaguin Canyon. Not to be confused with the Mud Springs of Locality 26. There is Alpine Fir and Douglas Fir forest here with Aspen and open Sagebrush coming in at lower elevations. The soil under some Alpine Firs here showed a pH of about 7.5. Green River Eocene. Elev. 8800 ft. Southeastern Duchesne County. Nos. 9461-9497.

73. Cottonwood Creek—A southern tributary of Minnie Maud Creek, some fifteen miles from its mouth. Shadscale desert in creek bottom between high rocky canyon walls which are scattered with

Utah Juniper and Pinyon Pine. A few specimens were collected along a steep dugway leading out of Cottonwood Canyon to the south, about six miles from its mouth. Green River Eocene. Elev. 5700-6000 ft. Carbon County. Nos. 9508-9526.

74. Willow Springs—Sagebrush slopes with scattered patches of Aspen, on the Tavaputs Plateau along the southern rim of the Basin and the east rim of Range Creek valley, about ten miles east of Sunnyside. Where the Sagebrush meets the Aspen the pH value was 7–. Green River Eocene. Elev. 9500-9700 ft. Carbon County. Nos. 9531-9579, 9615-9627.

75. Rock Creek—Stream tributary to the Green River and heading at Willow Springs (see Loc. 74). Its north-facing slope is an almost pure stand of Alpine Fir; its south-facing slope is Aspen and Sagebrush. Green River Eocene. Elev. 9200 ft. Carbon County. Nos. 9580-9614a.

76. West Fork of Douglas Creek, Colo.—Canyon at head of creek on the Tavaputs Plateau, along the southeastern Basin rim, filled with Aspens. Green River Eocene. Elev. 7700 ft. Garfield County, Colo. Nos. 9643-9703.

77. Middle Fork of Stuart Creek, Colo.—Upper part of a southern tributary of Piceance Creek about ten miles west of Rio Blanco, Colo., on the Tavaputs Plateau, near the southeastern Basin rim. A rather open valley of Sagebrush with patches of Aspen and oak. Wasatch Eocene. Elev. 7500-7600 ft. Garfield County, Colo. Nos. 9715-9764a.

78. Stuart Creek below camp, Colo.—Similar to and near Locality 77 but lower in the valley, and probably in southern Rio Blanco County, Colo. Green River Eocene. Elev. 7000 ft. Nos. 9767-9778a.

79. Post Canyon—A western tributary of upper Hill Creek on the Tavaputs Plateau which heads along the Basin's southern rim between the heads of Florence and Hill Creeks. Sagebrush with patches of Aspen and oak. The soil under oaks and also under Aspens here showed a pH value of 7; in Sagebrush nearby a pH of 6+ was shown. Green River Eocene. Elev. 7800-8700 ft. Grand County. Nos. 9826-9933a.

80. Head of Hill Creek—On the Tavaputs Plateau along the Basin's southern rim at the head of an eastern tributary of upper Hill Creek south of the head of Post Canyon and north of the head

of Flat Nose Canyon, which latter is on the south slope of the Brown Cliffs. Sagebrush on the plateau with Aspens and Alpine Fir in the canyons. Green River Eocene, with Wasatch Eocene possibly outcropping. Elev. 8000-8700 ft. Grand County. Nos. 9934-9951.

81. Florence Canyon—Eastern tributary of Green River near the south rim of the Basin, trenched in the Tavaputs Plateau. The head of the canyon in Aspen-Alpine Fir woods is at 8000 ft.; its mouth at the Green River among Mixed Desert Shrub is at 4300 feet. A collection was made (9965-9972) along the Green River at approximately 4500 feet between the mouths of Florence and Chandler Canyons. Green River Eocene in upper reaches, with Wasatch Eocene near the mouth of the Canyon. Grand County. Nos. 9952-9972.

82. Chandler Canyon—Eastern tributary of Green River north of Florence Canyon (see Loc. 81 to which it is similar). Southwestern Uintah County. Nos. 9973-9981.

83. Brush Creek Gorge—Narrow canyon of Brush Creek between the Humphrey Company road and where the creek seeps from the ground a few miles above. The stream is shaded with Box Elder, Douglas Fir and other trees; the upper canyon slopes have Sagebrush. Carboniferous. Elev. 6000-7000 ft. Uintah County. Nos. 9989-10021.

84. Chepeta Lake—Head of middle fork of Whiterocks River in the Uinta Mountains. The lake is surrounded by wet meadow and forest of the Spruce-Fir Zone. Some specimens, so labeled, were collected in mixed Lodgepole Pine-Spruce woods along the horse trail between Paradise Park and Chepeta Lake. These were near the Uintah-Duchesne County line; Chepeta Lake is in northeastern Duchesne County. Elev. 10,000-10,600 ft. Pre-Cambrian quartzite. Nos. 10071-10109.

85. Head of West Fork of Whiterocks River—Rocky Alpine Zone well above the trees to the summit of the Uinta range. Pre-Cambrian quartzite. Elev. 11,600-12,500 ft. Duchesne County. Nos. 10110-10131a.

86. Queant Lake—Lodgepole-Spruce woods along the horse trail from the lake to the West Fork of Whiterocks River in the Uinta Mountains. Pre-Cambrian quartzite. Elev. 10,500 ft. Duchesne County. Nos. 10132-10138.

87. Baxter Pass, Colo.—On the Tavaputs Plateau, along the south rim of the Basin about one mile west of the Uintah Railroad stop

in Sub-montane Shrub and Aspens with a few scattered Douglas Firs. Wasatch Eocene sandstone and variegated shale. Elev. 8300 ft. Garfield County, Colo. Nos. 10149-10166.

88. Bitter Creek, three miles east of the Utah-Colorado state line—A few miles west of Locality 87 on one of the uppermost east spurs of Bitter Creek. Aspen-Douglas Fir woods and Sagebrush. Wasatch Eocene. Elev. 7800 ft. Garfield County, Colo. Nos. 10167-10177.

89. Mirror Lake—Wet meadow and edge of mixed Lodgepole Pine-Spruce woods surrounding the lake, which is on the head of the North Fork of Duchesne River in the western Uinta Mountains. Pre-Cambrian quartzite. Elev. 10,000 ft. Northwest Duchesne County. Nos. 10199-10251.

ANNOTATED LIST

EQUISETACEAE

Equisetum arvense L. COMMON or FIELD HORSETAIL

A frequent plant of moist mid-altitude woods and lower altitude valleys, this Eurasian species was collected only in the Uinta Mts. *Graham 6504*, *6522*, and *7999* possess fertile fronds; the other numbers show sterile shoots only.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6231*, *Graham 6258;* S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6434;* W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6504;* up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6522*, *Graham 6555;* Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7999*.

Equisetum kansanum Schaffn. KANSAS SCOURING RUSH

Equisetum laevigatum A. A. Eaton, not A.Br. See Am. Fern Journ. **11:** 65-75. 1921.

A frequent plant of lower altitudes throughout the Basin, often in hard-packed soils. *Graham 6257*, *9978*, and *Douglass s. n.* show fertile fronds; the other specimens show sterile shoots only. Like *E. laevigatum*, this species is considered poisonous.

West side of Green River near Quarry "L," 4700 ft., June 18, 1931, *Graham 6088;* Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6257;* three miles W. of Dinosaur Quarry, 5500 ft., May 15, 1933, *Graham 7650;* Chandler Canyon, 6000 ft., Aug. 3,

1935, *Graham 9978;* Ainge Gulch, W. of Dinosaur Quarry, June 17, 1912, *Douglass s. n.;* Uinta Basin, July 13, 1912, *Peterson s. n.*

Equisetum laevigatum A. Br. SMOOTH SCOURING RUSH

Equisetum hiemale intermedium A. A. Eaton

The single sterile specimen cited was collected in the Uinta Mts. along a wooded stream in mixed aspen-pine forest. It is considered poisonous, especially to horses, when it is fed in hay which contains more than 25 per cent Equisetum.

Low ridge just below Moon Lake, 8000 ft., June 25, 1935, *Graham 9372.*

Equisetum praealtum Raf. GREAT SCOURING RUSH

Equisetum robustum A. Br.

An infrequent plant of Aspen woods and mid-altitude river valleys in the Uinta Mts. The May specimen is sterile; those collected in June are fertile.

South of Moon Lake, 8100 ft., June 30, 1931, *Graham 6442;* Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7792;* SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9331.*

SELAGINELLACEAE

Selaginella densa Rydb.

The following specimens are in the herbarium of F. J. Hermann at Ann Arbor, Michigan: rocky meadow, SE. slope of Mt. Emmons, 11,300 ft., July 19, 1933, *Hermann 5063* (also in Phil. Acad., Gray Herb., U. S. Nat. Herb., and Mo. Bot. Gard.); rocky moraine, SE. slope of Mt. Emmons, 11,450 ft., July 22, 1933, *Hermann 5219* (also in Phil. Acad.).

Selaginella mutica D. C. Eaton

An infrequent plant of shaded, rocky canyons at lower altitudes, collected only in the Uinta Mts. The specimens cited are sterile.

Sand hills out Maeser road, 6000 ft., May 2, 1933, *Graham 7592;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 10004.*

Selaginella Watsoni Underw.

A fairly frequent plant of rocky situations in the higher altitudes of the Uinta Mts. near and above tree line. The specimens cited are sterile.

Blanchard Park, head of Dry Fork Creek, 10,000 ft., July 5, 1933, *Graham 8405;* ridge NNW. of Paradise Park, 11,300 ft., July 8, 1933, *Graham 8426;* between E. ridge of Mt. Emmons and Chain Lakes, 11,300 ft., July 20, 1933, *Graham 8521.*

ISOETACEAE

Isoetes Bolanderi Engelm. QUILLWORT

A frequent plant of high altitude lakes in the Uinta Mts. near tree line. The specimens all bear sporangia.

Edge of third Chain Lake, 11,000 ft., July 21, 1933, *Graham 8590;* small lake E. of first Chain Lake, 10,500 ft., July 23, 1933, *Graham 8645;* adrift in S. end of Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10199.*

POLYPODIACEAE

Cheilanthes Feei Moore LIP FERN

An infrequent fern of mid-altitude rock crevices. Both specimens cited show opened sporangia.

Weber quartzite along Lapoint-Paradise Park road, S. base of Mosby Mt., 7 mi. NE. of Whiterocks, 7000 ft., Aug. 18, 1935, *Graham 10070;* Uinta Basin, June 29, 1912, *Peterson s. n.*

Cryptogramma acrostichoides R. Br. ROCK BRAKE

Cryptogramma crispa (L.) R.Br. var. *acrostichoides* (R.Br.) C. B. Clarke.

An infrequent fern of high altitude rock crevices in the vicinity of tree line, Uinta Mts. *Graham 6661* and *8551* show immature fertile fronds; the other two specimens show sterile fronds only.

Slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6654, Graham 6661;* cliff above third Chain Lake, 11,000 ft., July 20, 1933, *Graham 8551;* N. of Robert's Pass, NE. slope of Mt. Emmons, 11,300 ft., July 20, 1933, *Doutt s. n.*

Cystopteris fragilis (L.) Bernh. BRITTLE or FRAGILE FERN

Filix fragilis (L.) Gilib.

Probably the most common fern in the Basin, this old world species occurs in more or less moist, rocky places throughout the Uinta Mts. and higher Tavaputs Plateau from the Aspen Zone to the tree line, and occasionally in lower altitude canyons. For the most part the

June and early July specimens possess immature sporangia, while the late July and August numbers show mature sporangia.

West of Moon Lake, 8100 ft., July 1, 1931, *Graham 6476;* up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6550a;* slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6639, Graham 6651;* WNW. of Trout Creek Ranger Station, 10,500 ft., June 21, 1933, *Graham 8214;* Blanchard Park, head of Dry Fork Creek, 10,000 ft., July 5, 1933, *Graham 8388;* Dry Fork Creek W. of Marsh Peak, 10,000 ft., July 10, 1933, *Graham 8448;* between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 19, 1933, *Graham 8484;* below camp, above fourth Chain Lake, 11,000 ft., July 23, 1933, *Graham 8603;* below Willow Springs, 9500 ft., July 10, 1935, *Graham 9572;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9876, Graham 9899;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 9995, Graham 10021;* entrance to ice cave, Lodgepole Pine woods between Whiterocks River and Lapoint-Paradise Park road, N. of Red Pine Creek, 9800 ft., Aug. 17, 1935, *Graham 10061;* Bitter Creek, 3 mi. E. of Utah-Colorado state line, 7800 ft., Aug. 30, 1935, *Graham 10176.*

Pteridium aquilinum var. **pubescens** Underw. BRACKEN or BRAKE
Pteris aquilina pubescens Kuntze

Apparently a rare fern in the Basin, as it was observed only once, where, in the Uinta Mts. in the locality cited, it occurred in neutral soil in a small colony under Aspens. The specimen shows immature sporangia.

If eaten in large quantities, this fern is considered slightly poisonous to cattle, horses, and probably sheep, but its rarity in the Basin prevents it from being a seriously harmful plant there.

Southwest of Moon Lake, 8300 ft., June 23, 1935, *Graham 9333.*

Woodsia oregana D. C. Eaton

An infrequent fern of mid-altitudes in the Uinta Mts., found under rocks or on shaded rock ledges. The June specimen has mature sporangia; those collected in May are sterile or show very young sporangia. A specimen (*Graham 8095*) was also collected on the north slope of the Uinta Mts., in Jackson Draw.

Dry Fork, in Juniper Zone, 7000 ft., June 26, 1931, *Graham 6399;* Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7983;* Dry Fork Creek just above Dry Fork town, 6700 ft., May 12, 1935, *Graham 8812.*

Woodsia scopulina D. C. Eaton

A frequent fern of rocky situations at high altitudes in the vicinity of tree line, Uinta Mts. All of the specimens bear mature or well-developed sporangia.

Slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6636*, *Graham 6644*, *Graham 6652;* E. slope of Mt. Emmons, 11,600 ft., July 18, 1933, *Graham 8460;* cliff above third Chain Lake, 10,800 ft., July 20, 1933, *Graham 8539*, *Graham 8540;* N. of Robert's Pass, NE. slope of Mt. Emmons, 11,300 ft., July 20, 1933, *Doutt s. n.*

PINACEAE

Abies lasiocarpa (Hook.) Nutt. SUBALPINE or ALPINE FIR,
Abies subalpina Engelm. BLACK BALSAM

The Alpine Fir, with Engelmann's Spruce, forms the uppermost forested zone in the Uinta Mts., between the altitudes of 10,000 and 11,000 feet. It occurs occasionally as a dwarfed, wind-pruned straggler above tree line in the Alpine Zone, and it extends lower into the Lodgepole Pine and Aspen Zones as well, although it seldom fruits there. On the Tavaputs Plateau and in the west end of the Basin the Alpine Fir is in some situations co-dominant with the Aspen in forming the wooded covering of the Basin rim. In the canyons tributary to the Green River off lower Desolation Canyon, as in Rock Creek Canyon east of Willow Springs, Alpine Fir forms solid stands on the rather steep, north-facing slopes. It is lumbered to a certain extent in the Uinta Mts. A specimen (*Graham 9213*) was collected west of the Basin, in Daniel's Canyon. *Graham 8515*, *9238*, and *10138* possess cones; the other specimens cited are vegetative.

West of Moon Lake, 8100 ft., July 1, 1931, *Graham 6492* (with *Picea Engelmanni*); Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6614;* slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6633;* between E. ridge of Mt. Emmons and Chain Lakes, 11,300 ft., July 20, 1933, *Graham 8515;* head of Horse Creek, 7700 ft., June 18, 1935, *Graham 9238;* E. rim of Range Creek, near Willow Springs, 10 mi. E. of Sunnyside, 9700 ft., July 13, 1935, *Graham 9641;* head of Hill Creek, 8500 ft., July 31, 1935, *Graham 9940;* between Paradise Park and Chepeta Lake, 10,500 ft., Aug. 20, 1935, *Graham 10082;* Queant Lake, 10,500 ft., Aug. 22, 1935, *Graham 10138.*

Juniperus scopulorum Sarg. ROCKY MOUNTAIN JUNIPER

Sabina scopulorum (Sarg.) Rydb.

An infrequent tree which occurs in the upper Juniper-Pinyon Zone or immediately higher areas. Unlike *Juniperus utahensis*, it usually occurs as an isolated tree on canyon slopes and is nowhere common, although found throughout the Basin. It was also collected (*Graham 8116*) on the north slope of the Uinta Mts. in Jackson Draw, and on the south face of the Book Cliffs (*Graham 8340*) in Pine Canyon. *Graham 7816* and *9463* and *Doutt 4335* possess fruit; the remaining specimens are vegetative. This tree is sometimes referred to locally as "Cedar," and so distinguished from *Juniperus utahensis*, which is usually called "Juniper."

Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7816;* low ridge just below Moon Lake, 8000 ft., June 25, 1935, *Graham 9388;* E. tributary of Red Creek, 7500 ft., June 26, 1935, *Graham 9403;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9463;* ridge SW. of Dragon, 7800 ft., Aug. 31, 1935, *Graham 10182;* Yellowstone (East Fork of Lake Fork) Creek, 12 mi. N. of Mountain Home, 7800 ft., Aug. 18, 1936, *Doutt 4335*.

Juniperus sibirica Burgsd. DWARF JUNIPER

A frequent plant of high and mid-altitude forests throughout the Basin. In the Aspen Zone it sometimes forms the dominant undershrub, and in the Spruce-Fir Zone it is sometimes the sole understory plant. *Graham 6629*, *8275*, and *9601* show staminate flowers; *Graham 6346* is a vegetative specimen; the others all bear fruit. This entity is here referred to *J. sibirica*, although it has been considered at times one of several named varieties of *J. communis* L.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6346;* slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6629;* Davis Hollow, Taylor Mt., 8700 ft., Sept. 7, 1931, *Graham 7489*, *Graham 7495;* Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7819;* Trout Creek Ranger Station, 9300 ft., June 22, 1933, *Graham 8216a;* near Brush Creek, along Iron Springs road, 15 mi. N. of Vernal, 8500 ft., June 23, 1933, *Graham 8275;* Rock Creek, 9200 ft., July 11, 1935, *Graham 9601;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.;* Yellowstone (East Fork of Lake Fork) Creek, 12 mi. N. of Mountain Home, 7800 ft., Aug. 18, 1936, *Doutt 4334*.

Juniperus utahensis (Engelm.) Lemmon UTAH JUNIPER

Sabina utahensis (Engelm.) Rydb.

The dominant plant of the Juniper-Pinyon Zone throughout the Basin where, in many places, as north of Vernal, it is the only tree species in the zone. The wood has been used as fuel ever since the occupation of the Basin, which probably accounts for the absence of large trees near settlements, as north of Vernal. Species of Juniperus are sometimes considered to contain poisonous properties in the oil of their berries, but there have been no authentic cases of poisoning. *Graham 7581* is a seedling referred to this species because it was found growing under larger Utah Junipers; the other specimens all bear fruit of the current or preceding season. *Graham 7457* shows well-developed flower-like cone galls. It (*Graham 8110*) was also collected on the north slope of the Uinta Mts., in Jackson Draw, where it is common, as it is on the lower south-facing slopes of the Book Cliffs.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6290;* Juniper Zone below Moon Lake, 7500 ft., June 30, 1931, *Graham 6409;* Dry Fork, in Juniper Zone, 7000 ft., Sept. 5, 1931, *Graham 7457;* 5 mi. NW. of Dinosaur Quarry, 5500 ft., April 24, 1933, *Graham 7521;* head of Douglass Canyon, NW. of Dinosaur Quarry, 5500 ft., April 28, 1933, *Graham 7543;* sand hills out Maeser road, 6000 ft., May 2, 1933, *Graham 7581;* Cottonwood Springs, Little Mt., 6600 ft., May 22, 1933, *Graham 7788;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5800 ft., June 2, 1935, *Graham 9083;* Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9162;* Uinta Basin, June 29, 1912, *Peterson s. n.;* Kennedy's Draw, 20 mi. E. of Ouray, 4700 (?) ft., July 1, 1933, *Doutt 901.*

Picea Engelmanni (Parry) Engelm. ENGELMANN'S SPRUCE

This tree is the dominant constituent of the Spruce-Fir Zone, being in most places far more abundant than its associate, the Alpine Fir. It reaches upward as a dwarf tree into the Alpine Zone, and downward into the Lodgepole Pine Zone where the line between the Lodgepole and Spruce-Fir Zones is difficult to draw. It never goes below 9000 feet, except in such unique localities as that of Moon Lake. It has been found only in the Uinta Mts., where it is the most valuable timber tree and is called by the lumbermen "White Pine"; it probably does not occur on the Tavaputs Plateau. Members of

the Forest Service informed us that an Engelmann's Spruce near Paradise Park, cut about one foot from the ground, was slightly more than 38 inches in diameter and 315 years old. Another along Dry Fork above the Marsh Peak trail was slightly more than 46 inches in diameter and 363 years old. *Graham 6523* and *6592* are vegetative specimens; the others all possess cones.

Up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6518*, *Graham 6523;* Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6592;* WNW. of Trout Creek Ranger Station, 10,500 ft., June 21, 1933, *Graham 8212;* between E. ridge of Mt. Emmons and Chain Lakes, 11,300 ft., July 20, 1933, *Graham 8519;* Queant Lake, 10,500 ft., Aug. 22, 1935, *Graham 10137*.

Picea pungens Engelm. COLORADO BLUE SPRUCE

An infrequent tree of more or less open valleys along streams of the Sub-montane Shrub and Aspen Zones, occurring sparingly in both the Uinta Mts. and Tavaputs Plateau. It was also collected (*Graham 9216*) west of the Basin, in Daniel's Canyon. The Blue Spruce is considered the state tree of both Utah and Colorado. All of the specimens cited possess cones.

Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7818;* near Brush Creek along Iron Springs road, 15 mi. N. of Vernal, 8500 ft., June 23, 1933, *Graham 8272;* head of Bitter Creek, 3 mi. E. of the Utah-Colorado state line, 7800 ft., Aug. 30, 1935, *Graham 10174*.

Pinus edulis Engelm. PINYON or NUT PINE

Caryopitys edulis (Engelm.) Small

In many parts of the Juniper-Pinyon Zone this species is associated with the Utah Juniper, though seldom as common as the latter, and in many parts of the zone the Pinyon is almost lacking. It seldom occurs at such low altitudes as the lowermost Junipers but is most common at the upper reaches of the zone. It occurs throughout the Basin. *Graham 7595* and *8773* and *Peterson s. n.* are vegetative specimens; the others possess cones.

Along highway US 40 W. of Duchesne, 6500 ft., July 9, 1931, *Graham 6680;* sand hills out Maeser road, 6000 ft., May 2, 1933, *Graham 7595;* Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7820;* N. side of White River, 4 mi. NE. of mouth of Evacuation Creek, 5300 ft., May 7, 1935, *Graham 8773;* 5 mi. W. of Bitter Creek along

Ouray-Watson road, 6300 ft., May 26, 1935, *Graham 8996;* head of Deep Channel Creek, Colo., 6400 ft., June 4, 1935, *Graham 9124;* Red Wash above Island Park, 5200 ft., June 10, 1935, *Graham 9155;* NE. of Dinosaur Quarry, May 30, 1912, *Peterson s. n.*

Pinus flexilis James LIMBER PINE

Apinus flexilis (James) Rydb.

An infrequent tree of exposed, rocky situations throughout the Basin, particularly in the Aspen and Lodgepole Pine Zones. It was also collected (*Graham 8089*) on the north slope of the Uinta Mts., in Jackson Draw. All of the specimens possess cones.

Near Brush Creek along Iron Springs road, 15 mi. N. of Vernal, 8500 ft., June 23, 1933, *Graham 8271;* low ridge just below Moon Lake, 8000 ft., June 25, 1935, *Graham 9390;* Willow Springs, near Basin rim, 9550 ft., July 10, 1935, *Graham 9547;* on ridge W. of head of Post Canyon, 8200 ft., July 29, 1935, *Graham 9908;* rocky E. bluff of Whiterocks Canyon between Red Pine and Paradise Creeks, 9800 ft., Aug. 17, 1935, *Graham 10069.*

Pinus Murrayana Balf. LODGEPOLE PINE

Pinus contorta var. *latifolia* Engelm.

Pinus contorta var. *Murrayana* Engelm.

The Lodgepole Pine, or "Jack Pine" as sometimes called locally, forms dense forests on the south slope of the Uinta Mts. between the altitudes of 8700 and 10,000 feet, often reaching up into the adjoining Spruce-Fir Zone. It occasionally occurs in the lower Aspen Zone as well as in the lower river canyons. It forms similar forests on the north slope of the Uinta Mts. but has not been collected on the Tavaputs Plateau and probably does not occur there. In numbers of individuals it is the most abundant tree species in the Basin and it is much lumbered in the Uinta Mts., although inferior in value to Engelmann's Spruce. Mr. George Walkup, of the U. S. Forest Service, says a Lodgepole Pine which occurred in the Spruce-Fir Zone showed 400 annual rings. Sheep which are forced to eat the leaves of this and other conifers may become poisoned. *Graham 6591* is a vegetative specimen; *Graham 6382* and *8274* show staminate flowers; the remaining specimens possess cones of various ages.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6382;* Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6591;* slope above

Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6665;* Davis Hollow, Taylor Mt., 8700 ft., Sept. 7, 1931, *Graham 7494;* Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7817;* WNW. of Trout Creek Ranger Station, 10,000 ft., June 21, 1933, *Graham 8211;* near Brush Creek along Iron Springs road, 15 mi. N. of Vernal, 8500 ft., June 23, 1933, *Graham 8274.*

Pinus scopulorum (Engelm.) Lemmon ROCKY MOUNTAIN YELLOW, ROCK, or BULL PINE
Pinus brachyptera Engelm.
Pinus ponderosa scopulorum Engelm.

On the south slope of the Uinta Mts. the Yellow Pine is largely confined to the major stream valleys and reworked glacial soil, and on the north slope of the Uinta Mts., as at Green Lake, big trees occur in large stands. While it is usually found associated with Aspen, it may occur at higher altitudes or lower among the Junipers. Yellow Pine occurs sparingly on the Tavaputs Plateau, as at the head of Post Canyon, where several large trees stand among the Sagebrush and scattered Aspens. Here, as elsewhere, it formerly may have been more abundant, as evidence of fire is usually associated with it. It is lumbered in the Uinta Mts. It was also collected (*Doutt s. n.*) on the north face of the Uinta Mts. and on the south slope of the Book Cliffs (*Graham 8312*) in Pine Canyon. *Graham 6666* and *7596* are vegetative specimens; *Graham 8273* shows staminate flowers; the other specimens bear cones.

Dry Fork, in Juniper Zone, 7000 ft., June 26, 1931, *Graham 6403;* slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6666;* sand hills out Maeser road, 6000 ft., May 2, 1933, *Graham 7596;* Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7814;* near Brush Creek along Iron Springs road 15 mi. N. of Vernal, 8500 ft., June 23, 1933, *Graham 8273;* Post Canyon, 7900 ft., July 29, 1935, *Graham 9933.*

Pseudotsuga mucronata (Raf.) Sudw. RED or DOUGLAS FIR, DOUGLAS SPRUCE
Pseudotsuga Douglasii Carr
Pseudotsuga taxifolia (Lamb.) Britt

The Douglas Fir never attains large size in the Uinta Basin but is widely distributed there and less restricted in its altitudinal distribution than perhaps any other tree. At the west base of Blue Mountain, Island Park, in narrow steep canyons within a stone's throw of Mixed Desert Shrub, it grows to fair size at an altitude of

5300 feet, and specimens have been observed in Spruce-Fir forest west of Paradise Park at 10,300 feet. It is lumbered to a certain extent in the Uinta Mountains where the lumbermen call it "Red Pine." On the Tavaputs Plateau it occurred in sufficient quantity near Baxter Pass, Colorado, that most of the ties for the Uintah Railroad bed were cut there. It (*Graham 8316*) was also collected on the south slope of the Book Cliffs, in Pine Canyon. All of the specimens bear cones. The interior or Rocky Mountain form of Douglas Fir has sometimes been treated as a distinct species under the name *Pseudotsuga glauca* Mayr.

Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7815;* near Brush Creek along Iron Springs road, 15 mi. N. of Vernal, 8500 ft., June 23, 1933, *Graham 8270;* near U Ranch, Uinta River Canyon, 8000 ft., June 23, 1933, *Graham 8622b;* Red Wash above Island Park, 5200 ft., June 10, 1935, *Graham 9153;* on N.-facing slope of E. side-canyon, 3 mi. above mouth of Red Creek, 6300 ft., June 19, 1935, *Graham 9281;* low ridge just below Moon Lake, 8000 ft., June 25, 1935, *Graham 9386;* E. rim of Range Creek, near Willow Springs, 10 mi. E. of Sunnyside, 9700 ft., July 13, 1935, *Graham 9642;* Post Canyon, 8100 ft., July 29, 1935, *Graham 9904;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 10005;* Baxter Pass, Colo., 8300 ft., Aug. 29, 1935, *Graham 10150.*

EPHEDRACEAE

Ephedra nevadensis S. Wats. JOINT FIR, BRIGHAM or MORMON TEA

Dry Gulch, 7500 ft., August 8, 1927 *Lambert 78*, USFS 59302.

Ephedra Torreyana S. Wats. JOINT FIR, BRIGHAM or MORMON TEA

A frequent plant of the Mixed Desert Shrub Zone throughout the Basin. Like the following species, it is probably far less abundant now than formerly, due to persistent cropping by sheep. Many of the plants observed were producing only small shoots from heavy, old, woody bases. *Graham 6123* shows staminate flowers; *Doutt 892* is a fragmentary vegetative specimen; all the others represent pistillate plants, with *Graham 6171* showing mature fruit.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6123;* flat above Quarry "L," 4800 ft., June 20, 1931, *Graham*

6171; S. slope of Leland Bench, 5000 ft., May 13, 1935, *Graham 8840;* E. of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8933;* Willow Creek, near Thorne's ranch, 5300 ft., June 29, 1933, *Doutt 892.*

Ephedra viridis Coville JOINT FIR, BRIGHAM or MORMON TEA

An infrequent plant of upper Mixed Desert Shrub and lower Juniper-Pinyon Zones throughout the Basin. The common names of the preceding species apply as well to this. *Graham 9147, 9165* and *Peterson s. n.* show staminate flowers; the other specimens bear immature pistillate flowers with *Graham 9521* showing mature fruit.

Dry Fork Creek just above Dry Fork town, 6700 ft., May 12, 1935, *Graham 8813;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6500 ft., June 1, 1935, *Graham 9073;* Red Wash above Island Park, 5200 ft., June 10, 1935, *Graham 9147, Graham 9165;* Cottonwood Creek, 5700 ft., July 7, 1935, *Graham 9521;* NE. of Dinosaur Quarry, May 30, 1912, *Peterson s. n.*.

TYPHACEAE

Typha latifolia L. CAT-TAIL, CAT-TAIL FLAG

An infrequent plant, this world-wide species was observed only in the extensive river marsh of the locality cited, where it was less common than the associated *Scirpus occidentalis,* and in a very few other wet spots such as the small road-side pools on the south side of the Duchesne River east of Myton. The specimen is in flower.

Marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9803.*

SPARGANIACEAE

Sparganium angustifolium Michx. BUR REED

An infrequent aquatic species of upper altitude lakes. The June specimen is in flower; that of September is in fruit.

Small lake E. of first Chain Lake, SE. of Mt. Emmons, 10,500 ft., June 23, 1933, *Graham 8648;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10200.*

Sparganium minimum Fries

The following specimen is in the herbarium of the Missouri Botanical Garden: pond N. of first Chain Lake, SE. of Mt. Emmons, 10,600 ft., July 23, 1933, *Hermann 5228.*

POTAMOGETONACEAE

Potamogeton americanus Cham. & Schlecht. PONDWEED

Potamogeton fluitans Am. auth.

Potamogeton lonchites Tuckerm.

Observed only in the locality cited, where the specimen collected was in fruit. An elliptic-leaved vegetative specimen (*Graham 8412*) resembling *P. angustifolius* Berch. and Presl. was collected in a small lake east of Paradise Park at 10,000 ft., July 6, 1933.

In artificial pond, Hill Creek, above its junction with Willow Creek, 5000 ft., July 26, 1935, *Graham 9821*.

SCHEUCHZERIACEAE

Triglochin maritima L. ARROW GRASS

A world-wide species observed only in the single locality cited, where it occurred in the grassy margin of an extensive Scirpus-Typha swamp. The May specimen is in flower; that of July is in fruit.

In the marsh where the cited specimens were collected a nearby farmer had recently lost some cows which had died of poisoning, very probably caused by eating the leaves of this species, long known as a cyanogenetic plant capable of producing the highly poisonous hydrocyanic (prussic) acid. The plant is especially dangerous when large quantities are eaten in a short time, small quantities being apparently unharmful. There is no reliable remedy.

Marsh, mouth of Ashley Creek, 4750 ft., May 30, 1935, *Graham 9009;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9806*.

ALISMATACEAE

Sagittaria cuneata Sheld. ARROWHEAD, SWAN or SWAMP POTATO

Sagittaria arifolia Nutt.

A scarce plant observed only in the localities cited. Both specimens show flowers, with fruit also on the July number. The tuberous root-stocks of species of Sagittaria have long been used as food by the Indians.

In pond, along Lapoint-Neola road, just E. of Uinta River, 5700 ft., June 22, 1935, *Graham 9303;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9811*.

GRAMINEAE

Agropyron dasystachyum (Hook.) Scribn. THICKSPIKE WHEATGRASS

Throughout the Basin in low and mid-altitude sandy places. Both specimens are in flower.

Post Canyon, 8000 ft., July 29, 1935, *Graham 9930;* sand hills, Ainge Gulch, W. of Dinosaur Quarry, June 17, 1912, *Douglass s. n.*

Agropyron pauciflorum (Schwein.) Hitchc. SLENDER WHEATGRASS

Agropyron tenerum Vasey

Agropyron violaceum (Hornem.) Lange refers to alpine forms.

A frequent grass occurring from the Green River to mid-altitudes in the Uinta Mts., where, among the Aspens, it sometimes forms the dominant species of small meadow patches. The specimens show varying stages of maturing fruit.

Marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9820;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 10007;* forming open meadow among Aspens, Dyer Mine, 20 mi. N. of Vernal, 9000 ft., Sept. 4, 1935, *Graham 10190.*

Agropyron saxicola (Scribn. and Smith) Piper

Uinta River, Duchesne County, 7000 ft., July 7, 1928, *Weight 90,* USFS 60942.

Agropyron Smithii Rydb. BLUESTEM

Collected only in the lower desert areas of the Basin. The specimens show varying stages of maturing fruit.

West side of Green River, near Quarry "L," 4700 ft., June 22, 1931, *Graham 6221;* W. side of Green River, near Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7354;* Uinta Basin, July 13, 1912, *Peterson s. n.*

Agropyron Smithii var. **molle** (Scribn. & Smith) Jones

Agropyron molle (Scribn. & Smith) Rydb.

The single specimen cited was co-dominant with *Eurotia lanata* in a fenced area off the roadside just below Juniper-Pinyon woodland. The specimen shows old flowers and maturing fruit.

Ten miles S. of Rangely, Colo., 6400 ft., Aug. 31, 1935, *Graham 10180.*

Agropyron spicatum (Pursh) Scribn. & Smith BLUEBUNCH WHEATGRASS, BUNCH GRASS

Collected only in the locality cited, in open areas among aspen-pine woods. The specimen cited is in early anthesis.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6302.*

Agropyron subsecundum var. **andinum** (Scribn. and Smith) Hitchc.

The following specimens are in the U. S. National Herbarium: timber line above Chain Lakes, 11,300 ft., July 18, 1933, *Hermann 4968* (also in Mo. Bot. Gard. and herbarium of F. J. Hermann at Ann Arbor, Michigan), *Hermann 4984* (also in Gray Herb.).

Agrostis alba L. REDTOP

This Eurasian species is an occasional grass in moist areas of low altitude in the Uinta Basin. Both specimens show matured spikelets.

Along Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7396;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9797.*

Agrostis exarata Trin. SPIKE REDTOP

Agrostis asperifolia Trin.

The single fruiting specimen cited was collected in a dry open meadow patch among aspen-pine woods in the Uinta Mts.

Davis Hollow, Taylor Mt., 8700 ft., Sept. 7, 1931, *Graham 7485.*

Agrostis hiemalis (Walt.) B.S.P. TICKLE GRASS

Collected only in open areas of upper altitude woodland in the Uinta Mts. The specimens cited show varying stages of late anthesis and early maturity.

West of Moon Lake, 8100 ft., July 1, 1931, *Graham 6475, Graham 6494;* up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6538;* NE. of Paradise Park, 10,000 ft., Aug. 16, 1935, *Graham 10034.*

Agrostis humilis Vasey

A tiny grass collected only in alpine meadows of the Uinta Mts. near tree line. Both specimens show maturing spikelets. The species is here reported from Utah for the first time, our records extending its range to the south.

Between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 9, 1933, *Graham 8495;* W. side of second and third Chain Lakes, 10,700 ft., July 22, 1933, *Graham 8598.*

Agrostis palustris Huds. CREEPING BENT

Mosby Mt., Uintah Co., 8000 ft., Aug. 8, 1928, *Harp 5*, USFS 60945.

Agrostis Rossae Vasey ROSS REDTOP

The single flowering specimen cited was collected in the Spruce-Fir Zone of the Uinta Mts.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6573* (with *Trisetum spicatum*).

Agrostis Thurberiana Hitchc. THURBER'S REDTOP

The following specimens are in the U. S. National Herbarium: at timber line, above Chain Lakes, 11,300 ft., July 18, 1933, *Hermann 4955* (also in Phil. Acad.); near fourth Chain Lake, 11,200 ft., July 20, 1933, *Hermann 5107* (also in Mo. Bot. Gard. and Univ. Wyo.); N. shore of third Chain Lake, 11,000 ft., July 21, 1933, *Hermann 5176* (also in Gray Herb. and herbarium of F. J. Hermann at Ann Arbor, Michigan).

Alopecurus aequalis Sobol. SHORT-AWN FOXTAIL

Alopecurus aristulatus Michx.

This grass occurs throughout the uppermost forested zones in the Uinta Mts. where it sometimes occupies wet, muddy, open areas in the Spruce-Fir and Lodgepole Pine Zones to the exclusion of other species. The specimens all show mature spikelets.

Up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6529;* woods SE. of Queant Lake, 10,300 ft., Aug. 22, 1935, *Graham 10133;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10248.*

Alopecurus alpinus J. E. Smith ALPINE FOXTAIL

Alopecurus occidentalis Scribn. and Tweedy

The single, flowering specimen of this circum-arctic species cited was collected in a wet, grassy alpine meadow near tree line at the upper limit of the Spruce-Fir Zone in the Uinta Mts.

Chepeta Lake, 10,600 ft., Aug. 20, 1935, *Graham 10079.*

Aristida Fendleriana Steud. FENDLER'S THREE-AWN

Aristida longiseta Fendleriana Merr.

A species which frequents dry, sandy, desert areas of lowermost altitudes. Both specimens show maturing spikelets.

Flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6137;* desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8292.*

Avena fatua L. WILD OAT

The following specimen is in the herbarium of F. J. Hermann at Ann Arbor, Michigan: clay bank of irrigation ditch, roadside 1 mi. W. of Vernal, July 27, 1933, *Hermann 5307*.

Avena sativa L. OAT

The following specimen is in the herbarium of F. J. Hermann at Ann Arbor, Michigan: clay bank of irrigation ditch, roadside 1 mi. W. of Vernal, July 27, 1933, *Hermann 5306*.

Blepharoneuron tricholepis (Torr.) Nash HAIRY DROPSEED

Yellowstone Canyon, 10,000 ft., Sept. 15, 1926, *Lambert* and *Nord 8*, USFS 54194.

Bouteloua gracilis (H.B.K.) Lag. BLUE GRAMA

Utah River bridge, 7000 ft., Sept. 17, 1914, *DeMoisy Jr. 164*, USFS 18929.

Bromus anomalous Rupr. NODDING BROME

Bromus Porteri (Coult.) Nash

Mosby Park, 9500 ft., Aug. 28, 1914, *DeMoisy Jr. 154*, USFS 18933; Pole Creek Canyon, 8000 ft., Sept. 17, 1914, *DeMoisy Jr. 158*, USFS 18930; Yellowstone drainage, 7500 ft., June 26, 1928, *Weight 44*, USFS 60947.

Bromus ciliatus L. FRINGED BROME

Bromus Richardsoni Link

A tall, slender grass occurring in upper altitudes, particularly in wet meadows and streamsides of the Lodgepole Pine and Spruce-Fir Zones, Uinta Mts. The September specimen shows maturing, the others immature spikelets.

West of Moon Lake, 8100 ft., July 1, 1931, *Graham 6510;* between Mt. Emmons and Chain Lakes, 11,000 ft., July 20, 1933, *Graham 8535;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10206*.

Bromus inermis Leyss. SMOOTH BROME

This cultivated species has established itself throughout the Basin at mid-altitudes. It is often used to reseed western mountain ranges. The June specimen is in flower; the July number is in fruit.

Dry Fork, in Juniper Zone, 7000 ft., June 26, 1931, *Graham 6390;* Stuart Creek, Colo., near camp, 7000 ft., July 19, 1935, *Graham 9767*.

Bromus marginatus Nees

Bromus latior Rydb.

The specimen cited, with maturing fruit, was collected on the Tavaputs Plateau near the Basin rim in open Sagebrush country. The species is considered by Hitchcock (1935 p. 38) to intergrade with the western *Bromus carinatus* Hook. and Arn.

Head of Hill Creek, 8500 ft., July 31, 1935, *Graham 9942*.

Bromus polyanthus Scribn.

A species collected only on the Tavaputs Plateau near the southeast Basin rim. It is considered by Hitchcock (1935 p. 38) to intergrade with the western *Bromus carinatus* Hook and Arn. *Graham 9670* shows maturing, *9778a* mature, fruit.

West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9670;* Stuart Creek, Colo., near camp, 7000 ft., July 19, 1935, *Graham 9778a*.

Bromus tectorum L. DOWNY CHESS

A fairly common grass at low altitude, especially near Vernal, this European species occurs along roads and overruns old fields. It is said by natives, who regard it as a pest and call it "Cheat Grass," to have come into the Basin within the past ten or twelve years. The long beards (awns) of this species sometimes cause injury to stock by getting into the mouths of animals and causing inflammation and and occasionally loss of teeth. Both specimens show maturing fruit, those of *Graham 6271* being heavily infected with the smut, *Ustilago bromivora* (Tul.) Fisch.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6271;* Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9181*.

Bromus tectorum var. **glabratus** Spenner

Bromus tectorum var. *nudus* Klett. and Richt.

The variety of *B. tectorum* was collected only in the locality cited. The specimen shows young spikelets.

Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8011*.

Calomagrostis canadensis (Michx.) Beauv. BLUEJOINT

This variable species was collected only in the Uinta Mts. where it occurs in high altitude, wet meadows of the Spruce-Fir and Lodge-

pole Pine Zones. *Graham 10227* is in flower; *Graham 10134* shows maturing spikelets.

Woods SE. of Queant Lake, 10,300 ft., Aug. 22, 1935, *Graham 10134;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10227.*

Calamagrostis purpurascens R. Br. PURPLE REEDGRASS

The following specimen is in the herbarium of F. J. Hermann at Ann Arbor, Michigan: dry, rocky slope N. of third Chain Lake, 11,100 ft., July 21, 1933, *Hermann 5160* (also in U. S. Nat. Herb., Mo. Bot. Gard., Gray Herb., Univ. Wyo., Phil. Acad., and N. Y. Bot. Gard.).

Calamagrostis scopulorum Jones

This grass was collected only in the Uinta Mt. locality cited, where it was growing in large clumps on steep, rocky soil recently exposed by a land slide in mixed Lodgepole-Spruce woods. Both specimens show maturing spikelets.

Between Paradise Park and Chepeta Lake, 10,300 ft., Aug. 20, 1935, *Graham 10080, Graham 10083.*

Catabrosa aquatica (L.) Beauv. BROOK GRASS

A frequent grass throughout the Basin where it occurs in wet meadows or streams of upper and mid-altitudes. *Graham 7980* was growing in the water above an old beaver dam; it is in flower, while the other numbers show maturing spikelets.

Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7980;* SW. of Moon Lake, 8100 ft., June 24, 1935, *Graham 9348;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9863.*

Dactylis glomerata L. ORCHARD GRASS

A Eurasian species commonly cultivated; the number cited was collected at the edge of an alfalfa field. It is in flower.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6261.*

Danthonia californica Boland. CALIFORNIA OATGRASS

Dry Gulch, 8500 ft., July 26, 1926, *Lambert 2,* USFS 54197.

Danthonia intermedia Vasey TIMBER OATGRASS

Collected in the Uinta Mts. in a wet meadow near tree line. The specimen shows maturing spikelets.

Chepeta Lake, 10,600 ft., Aug. 20, 1935, *Graham 10076.*

Deschampsia caespitosa (L.) Beauv. TUFTED HAIRGRASS

Aira caespitosa L.

This Old World species is a frequent grass of high altitude meadows in the Uinta Mts., both below and above the tree line. In many places near tree line it is the dominant species of the alpine meadows. The specimens show spikelets in varying stages of anthesis and early maturity.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6586;* Paradise Park, 10,000 ft., July 4, 1933, *Graham 8373;* ridge NNW. of Paradise Park, 11,500 ft., July 8, 1933, *Graham 8438;* between E. ridge of Mt. Emmons and Chain Lakes, 11,300 ft., July 19, 1933, *Graham 8501;* head of W. Fork of Whiterocks River, 11,800 ft., Aug. 21, 1935, *Graham 10120;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10249.*

Distichlis stricta (Torr.) Rydb. DESERT SALTGRASS

A frequent species of lowermost altitudes where, in such areas as the regularly inundated flats along the Green River near the mouth of Ashley Creek, it is the sole species of rather extensive, alkaline flats. The specimens show spikelets in early anthesis.

Flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6158, Graham 6166;* W. side of Green River near Quarry "L," 4700 ft., June 22, 1931, *Graham 6220;* along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7424;* mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9793.*

Echinochloa Crusgalli (L.) Beauv. BARNYARD GRASS

This world-wide species was collected in moist, low altitude areas near cultivated fields. Both specimens show fruit.

Along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7419;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9801.*

Echinochloa Crusgalli var. **mitis** (Pursh) Peterm.

The following specimen is in the herbarium of F. J. Hermann at Ann Arbor, Michigan: clay bank of irrigation ditch, roadside 1 mi. W. of Vernal, July 27, 1933, *Hermann 5311* (also in U. S. Nat. Herb.).

Elymus ambiguus Vasey and Scribn.

The specimen cited was collected in the east end of the Basin on rocky clay-loam soil among Sagebrush and Junipers; it shows maturing spikelets.

South side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6000 ft., May 31, 1935, *Graham 9040.*

Elymus canadensis L. CANADA WILD RYE

The single specimen cited was collected in the margin of an extensive Scirpus-Typha swamp along Green River. It shows spikelets in anthesis.

Marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9818.*

Elymus condensatus Buckl. GIANT WILD RYE

A frequent grass of low and mid-altitudes throughout the Basin, especially along streamways where it often occurs in thick, dense clumps. It (*Graham 8103*) was also collected on the north slope of the Uinta Mts. in Jackson Draw. The specimens show varying stages of anthesis.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6253;* Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9183;* Stuart Creek, Colo., near camp, 7000 ft., July 19, 1935, *Graham 9776;* ridge W. of head of Post Canyon, 8000 ft., July 27, 1935, *Graham 9854;* White River bottom near Utah-Colorado state line, July 6, 1908, *Douglass s. n.;* Uinta Basin, July 13, 1912, *Peterson s. n.*

Elymus glaucus Buckl. BLUE WILD RYE

An infrequent grass in upper and mid-altitudes of both the Uinta Mts. and Tavaputs Plateau. Both specimens show spikelets in late anthesis.

Post Canyon, 7800 ft., July 28, 1935, *Graham 9857;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10207.*

Elymus salina Jones SALINA WILD RYE

A frequent grass throughout the Basin at mid-altitudes. It was also collected (*Graham 9628*) on the south face of the Book Cliffs in Water Canyon. The species is considered to be good summer feed for cattle in the Basin. The May specimen shows old spikelets of the preceding year; that of July shows flowers of the present season.

East of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8932;* Stuart Creek, Colo., near camp, 7000 ft., July 19, 1935, *Graham 9770.*

Festuca Kingii Cassidy SPIKE FESCUE

Festuca confinis Vasey
Hesperochloa Kingii (S. Wats.) Rydb.

Collected only among mid-altitude Sagebrush in the west end of the Basin. The specimen cited shows old flowers with mature fruit and empty glumes.

West side of Red Creek, 7500 ft., June 27, 1935, *Graham 9453*.

Festuca octoflora Walt. SIX-WEEKS FESCUE

A frequent grass of low altitude sandy areas, especially in the Mixed Desert Shrub Zone. The May specimens show maturing spikelets; that of June possesses empty glumes on dried plants of the preceding season.

In sandy wash of rocky bench, Leota road near highway US 40, 15 mi. SW. of Vernal, 5000 ft., May 21, 1935, *Graham 8917;* bench W. of Green River, S. of Uteland Butte, 4800 ft., May 16, 1935, *Graham 8895a;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Festuca ovina L. SHEEP FESCUE

Festuca calligera Rydb.
Festuca minutiflora Rydb.
Festuca saximontana Rydb.

This Eurasian species is a frequent grass of upper altitude open woodlands in the Uinta Mts. The specimens all show maturing spikelets.

South of Moon Lake, 8100 ft., June 30, 1931, *Graham 6445;* near third Chain Lake, 11,000 ft., July 21, 1933, *Graham 8582;* W. side of second and third Chain Lakes, 10,700 ft., July 22, 1933, *Graham 8596*.

Festuca ovina var. **brachyphylla** (Schult.) Piper ALPINE FESCUE

Festuca brachyphylla Schult.

A frequent grass near and above tree line in the Uinta Mts. It grows in small meadows and tiny sod patches among the broken rocks of the Alpine Zone. *Graham 8466* was collected in such a situation on the very summit of Mt. Emmons. The specimens show varying stages of anthesis.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6580;* slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6642;* among rocks on top of Mt. Emmons, 13,400 ft., July 18, 1933, *Graham 8466* (with *Poa Lettermani* Vasey).

Glyceria borealis (Nash) Batchelder NORTHERN MANNAGRASS

Panicularia borealis Nash

Collected only in the Uinta Mts. at a lake edge in mixed Lodgepole-Spruce forest. The single specimen cited shows spikelets in anthesis.

Edge of lake NE. of Paradise Park, 10,300 ft., Aug. 16, 1935, *Graham 10039.*

Glyceria elata (Nash) Hitchc. TALL MANNAGRASS

Panicularia elata Nash

Collected only in the Uinta Mts. along a rocky river bank in a narrow aspen-pine filled valley. The single specimen cited is in flower.

West side of Uinta River at sheep bridge, 8500 ft., July 23, 1933, *Graham 8623.*

Glyceria pauciflora Presl WEAK MANNAGRASS

Panicularia pauciflora (Presl.) Kuntze

Collected only in the Uinta Mts. along a stream in upper altitude mixed aspen-pine forest. The single specimen cited is in flower.

Up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6519.*

Glyceria striata (Lam.) Hitchc. FOWL MANNAGRASS

Glyceria nervata (Willd.) Trin.

Panicularia nervata (Willd.) Kuntze

Although collected only on the Tavaputs Plateau east of the Green River, along streams in the Aspen Zone, it probably occurs elsewhere in the Basin. Both specimens show flowers and young fruit.

West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9690;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9884.*

Hierochloë odorata (L.) Beauv. SWEET GRASS

Savastana odorata (L.) Scribn.

Torresia odorata (L.) Hitchc.

Whiterocks, 6000 ft., May 10, 1914, *DeMoisy Jr. 2,* USFS 18950; Mosby Mill Canyon, 7500 ft., June 24, 1914, *DeMoisy Jr. 78,* USFS 18942.

Hilaria Jamesii (Torr.) Benth. GALLETA GRASS

Pleuraphis Jamesii Torr.

A common grass throughout the Mixed Desert Shrub Zone, where it is usually associated with Shadscale and Kochia. It is most abun-

dant as a co-dominant plant with *Kochia vestita* on rocky flats of an extreme desert type where no woody shrubs are to be found. In the Basin it is called "Curly Grass" and is much cropped by sheep. The specimens cited show varying stages of anthesis.

Flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6165;* near Pariette Mine, 10 mi. SE. of Myton, 5000 ft., May 26, 1933, *Graham 7850;* bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7931;* desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8288;* desert S. of Myton, 5500 ft., June 28, 1933, *Graham 8333;* S. slope of Leland Bench, 5000 ft., May 13, 1935, *Graham 8831;* E. of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8944;* E. of Willow Creek, near school house, 5300 ft., May 24, 1935, *Graham 8974;* Red Wash above Island Park, 5200 ft., June 10, 1935, *Graham 9170;* Uinta Basin, June 9, 1912, *Peterson s. n.;* Ainge Gulch, W. of Dinosaur Quarry, June 17, 1912, *Douglass s. n.*

Hordeum jubatum L. FOXTAIL BARLEY or SQUIRRELTAIL GRASS

A frequent grass throughout the Mixed Desert Shrub Zone and an especially troublesome plant in irrigated areas where it grows well. The June specimens show flowers; the later numbers exhibit developing fruit.

Although eaten by stock when green, the long beards (awns) of mature seeds may cause injury to the mouths of animals which eat them.

Flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6159, Graham 6167;* along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7427;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9796.*

Hordeum jubatum var. **caespitosum** (Scribn.) Hitchc.

Hordeum caespitosum Scribn.

The single fruiting specimen of the variety of *Hordeum jubatum* cited was collected in a lowland which had been inundated by the Green River earlier in the season.

West side of Green River, near Quarry "L," 4700 ft., June 18, 1931, *Graham 6084.*

Hordeum nodosum L. MEADOW BARLEY

This species, widely dispersed in the old world, was collected only in mid-altitude zones of the Tavaputs Plateau where it occurred in

meadows along streams. Both specimens show maturing spikelets.

West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9648;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9888.*

Hordeum pusillum Nutt. LITTLE BARLEY

Represented in our collections only by the fruiting specimen cited and the data given. It is probably from the Mixed Desert Shrub Zone near the Dinosaur Quarry.

Uinta Basin, June 9, 1912, *Peterson s. n.*

Koeleria cristata (L.) Pers. JUNE GRASS

Koeleria gracilis Pers.

This introduced species is a frequent grass throughout the Basin in upper and mid-altitudes, extending into high, rocky situations of the Alpine Zone above tree line. Graham 8472 shows empty glumes of the preceding season; the remaining specimens show spikelets in varying stages of anthesis.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6322;* W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6484;* E. slope of Mt. Emmons above Chain Lakes, 12,000 ft., July 18, 1933, *Graham 8472;* middle fork of Stuart Creek, Colo., 7500 ft., July 18, 1935, *Graham 9727, Graham 9758.*

Muhlenbergia asperifolia (Nees & Mey.) Parodi SCRATCH GRASS

Sporobolus asperifolius (Nees and Mey.) Nees

Collected only in the locality cited. The specimen is in fruit, the grains being infected with the smut, *Tilletia asperifolia* Ellis and Ev.

Along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7423.*

Oryzopsis exigua Thurb. LITTLE RICEGRASS

Brush Creek, 9200 ft., July 18, 1927, *VanTassell* and *Lambert 41,* USFS 59271.

Oryzopsis hymenoides (Roem. and Schult.) Ricker

INDIAN RICEGRASS

Eriocoma hymenoides Rydb.

Stipa hymenoides Roem. and Schult.

One of the most common and conspicuous grasses of the Basin throughout the Mixed Desert Shrub Zone. It reaches upward into mid-altitudes on open shale slopes and is much cropped by sheep.

The June specimens show developing, the later numbers mature fruit, except the two August specimens which have only empty glumes.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6109;* flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6140*, *Graham 6155;* flat above Quarry "L," 4800 ft., Aug. 31, 1931, *Graham 7367;* bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7941;* desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8299;* draw E. of Willow Creek, near school house, 5300 ft., May 23, 1935, *Graham 8968;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9078;* Red Wash above Island Park, 5200 ft., June 10, 1935, *Graham 9169;* one mi. W. of Baxter Pass, Colo., 8300 ft., Aug. 29, 1935, *Graham 10149;* Uinta Basin, June 9, 1912, *Peterson s. n.;* Ainge Gulch, W. of Dinosaur Quarry, June 17, 1912, *Douglass s. n.*

Phleum alpinum L. ALPINE TIMOTHY

This circum-arctic plant is a frequent species of wet meadows and stream-banks at upper altitudes of the Uinta Mts. The specimens show spikelets in various stages of maturity.

Up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6545*, *Graham 6556;* Paradise Park, 10,000 ft., July 4, 1933, *Graham 8371;* woods NE. of Paradise Park, 10,200 ft., Aug. 16, 1935, *Graham 10029;* Chepeta Lake, 10,600 ft., Aug. 21, 1935, *Graham 10105*.

Phleum pratense L. TIMOTHY

Escaped from cultivation and collected only at the locality cited. The specimen shows maturing spikelets.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6260*.

Phragmites communis Trin. COMMON REED

Phragmites phragmites (L.) Karst.

In the Uinta Basin this world-wide species is confined to river marshes and wet areas below springs in the Mixed Desert Shrub Zone. The May specimen shows the dried inflorescence of the preceding year; that of July exhibits maturing spikelets.

North of Dinosaur Quarry, 5500 ft., May 18, 1933, *Graham 7722;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9810*.

Poa alpina L. ALPINE BLUEGRASS

This circum-arctic species was collected in a wet, park-like meadow

in mixed Lodgepole-Spruce forest of the Uinta Mts.; it shows young spikelets (in bud).

Paradise Park, 10,000 ft., July 4, 1933, *Graham 8374.*

Poa arida Vasey PLAINS BLUEGRASS

The specimen cited was collected on the Tavaputs Plateau in Sagebrush along an old road in the Aspen Zone; it shows flowering spikelets.

Post Canyon, 8000 ft., July 29, 1935, *Graham 9901.*

Poa curta Rydb.

The single flowering specimen cited, from the west end of the Basin, was abundant under Aspens there.

Horse Creek, 7700 ft., June 18, 1935, *Graham 9263.*

Poa epilis Scribn. SKYLINE BLUEGRASS

The single specimen cited, which shows immature spikelets, was collected in a patch of rocky alpine meadow in the Uinta Mts. above timber line.

Ridge NNW. of Paradise Park, 11,000 ft., July 8, 1933, *Graham 8423.*

Poa Fendleriana (Steud.) Vasey MUTTON GRASS

A frequent grass of mid-altitudes throughout the Basin in dry, open areas and Aspen woods and in the larger wooded canyons. The specimens show varying stages of maturing spikelets.

Uinta River Canyon, above Big Park, 7500 ft., May 31, 1933, *Graham 7982;* near Little Lake, 8500 ft., June 22, 1933, *Graham 8223;* Willow Springs, 9600 ft., July 10, 1935, *Graham 9536;* E. rim of Range Creek near Willow Springs, 9500 ft., July 12, 1935, *Graham 9616.*

Poa interior Rydb. INLAND BLUEGRASS

Uinta Parks, Duchesne County, 8000 ft., July 1, 1928, *Starr 68,* USFS 60964.

Poa leptocoma Trin.

See *Carex pseudoscirpoidea, Graham 8579.*

Poa Lettermani Vasey

See *Festuca ovina* var. *brachyphylla, Graham 8466.*

Poa longiligula Scribn. and Williams LONGTONGUE MUTTON GRASS

A frequent grass of low and mid-altitudes in wooded canyons and dry, forested areas. The specimens all show maturing spikelets.

Orchid (Mud) Springs Canyon, 5000 ft., May 20, 1933, *Graham 7750;*

Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8024;* SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9322.*

Poa nervosa (Hook.) Vasey WHEELER'S BLUEGRASS

Poa Wheeleri Vasey

A frequent bunch-grass throughout the Basin at upper and mid-altitudes, where it occurs in woodlands and dry open areas. The specimens show flowering spikelets in varying stages of development.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6358;* Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6585, Graham 6595;* E. slope of Wolf Creek Pass, 9000 ft., June 16, 1933, *Graham 8144;* Post Canyon, 8500 ft., July 31, 1935, *Graham 9937.*

Poa palustris L. FOWL BLUEGRASS

Poa triflora Gilib.

In the single locality cited in the west end of the Basin, this Eurasian species was collected along a stream under Aspens. The specimen shows young spikelets.

East tributary of Red Creek, 7500 ft., June 26, 1935, *Graham 9397.*

Poa pratensis L. KENTUCKY BLUEGRASS

This cultivated European species is a frequent grass throughout the Basin in moist woodland areas of mid- and lower-altitudes. All of the specimens show flowering spikelets.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6225, Graham 6262;* W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6480;* up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6557;* W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9657.*

Poa reflexa Vasey and Scribner NODDING BLUEGRASS

Trout Creek Ranger Station, Uintah County, 10,000 ft., Aug. 24, 1928, *Weight 166,* USFS 60965.

Poa secunda Presl SANDBERG'S BLUEGRASS

Poa Sandbergii Vasey

A common grass throughout the Basin in more or less dry situations through all the altitudinal zones from the Green River to the uppermost forests, but not collected above the trees under strictly alpine conditions. *Graham 7939, 9055* and *9320* are in flower; the other specimens show young spikelets (in bud).

Bad lands N. of Skull Pass Quarry, 5000 ft., May 9, 1933, *Graham 7645;* hills E. of Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7695;* bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7939;* forest NNW. of Paradise Park, 10,700 ft., July 8, 1933, *Graham 8422;* between E. ridge of Mt. Emmons and Chain Lakes, 11,300 ft., July 19, 1933, *Graham 8514;* rocky wash, Uteland Mine, 4800 ft., May 17, 1935, *Graham 8899;* 5 mi. W. of Bitter Creek along Watson-Ouray road, 6300 ft., May 26, 1935, *Graham 8983;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6000 ft., May 31, 1935, *Graham 9030;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6400 ft., June 1, 1935, *Graham 9055;* SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9320;* hills E. of Dinsosaur Quarry, May 29, 1912, *Peterson s. n.*

Polypogon monspeliensis (L.) Desv. RABBITFOOT GRASS

A European introduction found only in low altitude areas of considerable moisture. Both specimens show maturing spikelets.

Along Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7408;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9779.*

Puccinellia Nuttalliana (Schult.) Hitchc. NUTTALL'S ALKALI GRASS

Puccinellia airoides (Nutt.) Wats. and Coult.

An infrequent grass of the Mixed Desert Shrub Zone in the central part of the Basin. The June specimen shows maturing, the August number matured spikelets.

Desert S. of Myton, 5500 ft., June 28, 1933, *Graham 8334;* along Willow Creek, at Thorne's Ranch, 5 mi. N. of mouth of Agency Draw, 5100 ft., Aug. 5, 1935, *Graham 9984.*

Sitanion Hystrix (Nutt.) J. G. Smith SQUIRRELTAIL

Sitanion ciliatum Elmer
Sitanion cinereum J. G. Smith
Sitanion marginatum Scribn. and Merr.

A frequent grass of low and mid-altitude dry places throughout the Basin. The May specimen shows immature, the other numbers maturing spikelets.

Bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7940;* Red Wash above Island Park, 5200 ft., June 10, 1935, *Graham 9167;* Post Canyon, 8000 ft., July 29, 1935, *Graham 9902;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Sitanion jubatum J. G. Smith BIG SQUIRRELTAIL

Sitanion breviaristatum J. G. Smith
Sitanion villosum J. G. Smith

A frequent grass in dry situations of the central Basin Mixed Desert Shrub Zone. All of the specimens show matured spikelets.

West of Green River, near Quarry "L," 4700 ft., June 19, 1931, *Graham 6093;* flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6171b;* desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8287.*

Sporobolus airoides Torr. ALKALI SACATON

Although a frequent grass in dry areas of the lower Mixed Desert Shrub Zone in the Uinta Basin, this species has not been observed there to form a closed association (associes) as it does (Shantz, in Tidestrom 1925, p. 21) in other parts of Utah and Nevada. The June specimens are in flower; the July number shows fruiting spikelets.

West side of Green River near Quarry "L," 4700 ft., June 22, 1931, *Graham 6216;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9781;* Ainge Gulch, W. of Dinosaur Quarry, June 17, 1912, *Douglass s. n.*

Sporobolus contractus Hitchc. SPIKE DROPSEED

Sporobolus strictus (Scribn.) Merr., not Franch.

The single fruiting specimen cited was collected on a sandy, Rabbitbrush (*Chrysothamnus stenophyllus*) flat.

Flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6138.*

Sporobolus cryptandrus (Torr.) A. Gray SAND DROPSEED

The following specimen is in the U. S. National Herbarium: Ashley Creek Canyon 10 mi. NW. of Vernal, July 14, 1933, *Hermann 4923.*

Stipa columbiana Macoun COLUMBIA NEEDLEGRASS

Stipa minor (Vasey) Scribn.

The single maturing specimen cited was collected in the southeastern portion of the Basin in Sagebrush of the Sub-montane Shrub Zone among patches of Aspens.

Stuart Creek, Colo., near camp, 7000 ft., July 19, 1935, *Graham 9778.*

Stipa comata Trin. and Rup. NEEDLE-AND-THREAD

A frequent grass in dry situations throughout the low altitudes of the Mixed Desert Shrub and Juniper-Pinyon Zones. It is considered

one of the principal upland prairie hay grasses in the northern Great Plains and is much cropped by sheep in the Basin. All of the specimens are in fruit, with *Graham 8302* showing only empty glumes.

While not usually considered to be a poisonous plant, the twisted, long bearded (awned) seeds of this species, the bases of which are pointed and covered with barbs, often work into the mouthparts of animals, causing mechanical injury such as ulceration, or work into wool and skin, causing troublesome irritation.

Dry Fork, in Juniper Zone, 7000 ft., June 26, 1931, *Graham 6387;* bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7933;* desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8302;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9079;* Red Wash above Island Park, 5200 ft., June 10, 1935, *Graham 9184;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Stipa comata T. and R. var. **intermedia** Scribn. and Tweedy

Stipa Tweedyi Scribn.

A frequent grass throughout the Basin in dry areas of mid-altitude woodlands. All of the specimens are in fruit.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6335, Graham 6366;* Post Canyon, 8000 ft., July 29, 1935, *Graham 9903;* head of Hill Creek, 8500 ft., July 31, 1935, *Graham 9936.*

Stipa Lettermani Vasey LETTERMAN'S NEEDLEGRASS

A frequent grass throughout the Basin in dry open areas and woodlands of mid-altitudes, where it sometimes (*Graham 10193*) occurs in abundance as a co-dominant with Sagebrush (*Artemisia cana*). The September specimen is in fruit; the other two numbers are in flower.

South of Moon Lake, 8100 ft., June 30, 1931, *Graham 6462;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9893;* in great meadows along Vernal-Manila road N. of Vernal, 8000 ft., Sept. 4, 1935, *Graham 10193.*

Stipa Williamsii Scribn. WILLIAMS' NEEDLEGRASS

Mill Canyon Ridge, Mosby Mt., Uintah County, 8000 ft., Aug. 19, 1930, *Walkup 117*, USFS 66380.

Trisetum spicatum (L.) Richt. SPIKE TRISETUM

Trisetum subspicatum (L.) Beauv.

This variable and world-wide species occurs frequently in the

Uinta Mts. in upper altitude forests and occasionally extends into the treeless Alpine Zone. All of the specimens show young spikelets and flowers except *Graham 10041* which is in fruit.

Up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6536;* Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6593* (with *Carex concolor*); meadow above trees, N. of Chain Lakes, 11,400 ft., July 20, 1933, *Graham 8570, Graham 8570a;* Lodgepole woods NE. of Paradise Park, 10,200 ft., Aug. 16, 1935, *Graham 10041;* Chepeta Lake, 10,600 ft., Aug. 21, 1935, *Graham 10106;* (see also *Agrostis Rossae, Graham 6573*).

Trisetum Wolfii Vasey WOLF'S TRISETUM

Graphephorum Wolfii Vasey

The single fruiting specimen cited was collected in the west end of the Uinta Mts. at the edge of a wet-meadow stream near mixed Lodgepole-Spruce forest.

Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10208.*

In addition to the grasses listed above, Pammel (1913) lists eight species from the south slopes of the Uinta Mountains, specimens of which I have so far been unable to examine. They are: *Agropyron Richardsonii* (*A. subsecundum* (Link) Hitchc.); *Calamagrostis hyperborea* var. *americana* (Vasey) Kearney (*C. inexpansa* A. Gray); *Elymus simplex* Scribn. (*E. triticoides* var. *simplex* (Scribn.) Hitchc.); *Muhlenbergia comata* Benth. (*M. andina* (Nutt.) Hitchc.); *Muhlenbergia racemosa* (Michx.) B.S.P.; *Stipa Scribneri* Vasey; *Sporobolus aspericaulis* Trin. (*Muhlenbergia squarrosa* (Trin.) Rydb.); *Sporobolus gracillimus* (Thurb.) Vasey (*Muhlenbergia filiformis* (Thurb.) Rydb.).

CYPERACEAE

Carex albonigra Mack.

The single maturing specimen cited was collected on the crest of the Uinta Mts., where it grew among broken rocks on the bare summit of an Alpine Zone ridge.

NNW. of Paradise Park, 11,500 ft., July 8, 1933, *Graham 8428.*

Carex aquatilis Wahl.

This Eurasian species is a common sedge of lake margins and wet meadows in the Lodgepole Pine Zone of the Uinta Mts. where it is a

primary factor in the vegetative invasion of glacial lakes. The July specimen is in flower; the others exhibit maturing achenes.

Lake edge E. of Paradise Park, 10,000 ft., July 6, 1933, *Graham 8413;* Chepeta Lake, 10,600 ft., Aug. 20, 1935, *Graham 10078;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10201*, *Graham 10224*.

Carex athrostachya Olney

Dry Gulch, 8600 ft., July 26, 1926, *Lambert 34*, USFS 54215.

Carex atrata L.

The specimens of this Eurasian species cited were collected in wet meadows of the upper Lodgepole Pine Zone in the Uinta Mts. *Graham 8370* is so immature that its determination is questionable.

Paradise Park, 10,000 ft., July 4, 1933, *Graham 8370;* meadow, SE. slope of Mt. Emmons, July 1933, *Hermann 4965* (in herbarium of Frederick J. Hermann, Ann Arbor, Michigan).

Carex aurea Nutt.

There is a specimen of this species in the herbarium of Frederick J. Hermann at Ann Arbor, Michigan, collected in late July, 1933 at an alpine lake on the southeast side of Mt. Emmons (*Hermann 5037*).

Carex bella Bailey

The single specimen cited is in flower.

Under spruce clump, meadow at timber line above Chain Lakes, Krebs Basin, SE. slope of Mt. Emmons, 11,300 ft., July 19, 1933, *Hermann 5079*.

Carex brunnescens (Pers.) Poir.

The single specimen of this Eurasian species cited is in fruit. Dr. F. J. Hermann and the writer collected this species for the first time in Utah, but it has already been reported by Dr. Hermann (see Rhodora **36**: 410. 1934).

Frequent on boggy N. shore of third Chain Lake, Krebs Basin, SE. slope of Mt. Emmons, 11,100 ft., July 21, 1933, *Hermann 5183*.

Carex canescens L.

The single specimen of this world-wide species cited is in fruit.

Up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6533*.

Carex capillaris L.

The single specimen of this Eurasian species cited is in fruit.

Rocky alpine tundra, shore of lake (fourth Chain) Krebs Basin, SE. slope of Mt. Emmons, 11,350 ft., July 19, 1933, *Hermann 5033*.

Carex concolor R. Br.

This Eurasian species is a frequent sedge of moist situations in the Spruce-Fir Zone of the Uinta Mts. *Graham 8592* is immature and questionably determined; the other numbers are in flower.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6583b* (on sheet with *Carex nigricans*, *Graham 6583a*); Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6601;* W. side of second and third Chain Lakes, 10,700 ft., July 22, 1933, *Graham 8592*. (See also *Trisetum spicatum*, *Graham 6593*.)

Carex disperma Dewey

This Eurasian species is a frequent sedge of wet meadows in upper altitude forests of the Uinta Mts. The specimens all show maturing achenes.

South of Moon Lake, 8100 ft., June 30, 1931, *Graham 6419;* W. side of second and third Chain Lakes, 10,700 ft., July 22, 1933, *Graham 8594;* SW. of Moon Lake, 8100 ft., June 24, 1935, *Graham 9355*.

Carex Douglasii Boott

The single specimen cited was collected in an irrigated field; it is in flower with young achenes. There is also a specimen (*Hermann 4758*) from the north rim of the Uinta Mts. collected at the edge of Aspens in Sagebrush SW. of Dowd's Hole.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6226*.

Carex Drummondiana Dewey

Carex rupestris of Am. auth., not All.

There is a specimen (*Hermann 4999*) of this species in the herbarium of Frederick J. Hermann at Ann Arbor, Michigan; it was collected at the edge of an alpine pond on the northeast slope of Mt. Emmons in late July, 1933.

Dr. F. J. Hermann with the writer collected this species for the first time in Utah, and it has already been reported by Dr. Hermann (See Rhodora **36**: 409. 1934).

Carex ebenea Rydb.

A common sedge of wet meadows in the Lodgepole Pine and Spruce-Fir Zones of the Uinta Mts. All of the specimens show flowers.

East of Paradise Park, 10,000 ft., July 4, 1933, *Graham 8372;* SE. slope of Mt. Emmons, 11,300 ft., July 19, 1933, *Graham 8506;* Chepeta Lake, 10,600 ft., Aug. 20, 1935, *Graham 10077.*

Carex Egglestonii Mack.

There is a specimen of this species in the herbarium of Frederick J. Hermann at Ann Arbor, Michigan, collected in late July, 1933, on the dry rocky slope north of the third Chain Lake, where it was common, on the southeast slope of Mount Emmons in the Spruce-Fir Zone (*Hermann 5186*).

Carex Eleocharis Bailey

Carex stenophylla Wahl.

This Eurasian species is an infrequent sedge of moist areas in upper and mid-altitude woodlands in the Uinta Mts. Both specimens show flowers and maturing achenes.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6320;* up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6539.*

Carex epapillosa Mack.

Head, East Fork of Whiterocks Creek, 11,000 ft., Aug. 11, 1914, *DeMoisy, Jr.* 13½, USFS 18954½.

Carex festivella Mack.

Carex festiva auth., as to Rocky Mt. plants.

A frequent sedge of streams and wet meadows in upper altitude forests of the Uinta Mts. *Graham 6436, 8182* and *9576* are immature and questionably determined; the remaining specimens show flowers and varying stages of maturing achenes.

South of Moon Lake, 8100 ft., June 30, 1931, *Graham 6436;* up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6558;* Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8182;* Willow Springs, 9550 ft., July 10, 1935, *Graham 9534;* Willow Springs, 9500 ft., July 10, 1935, *Graham 9576;* W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9646;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9880.*

Carex Haydeniana Olney

Carex nubicola Mack.

The single flowering specimen cited was collected in a patch of Alpine Zone meadow in the Uinta Mts.

Head of W. Fork of Whiterocks River, 11,600 ft., Aug. 21, 1935, *Graham 10116;* tree line meadow, SE. slope of Mt. Emmons, July, 1933, *Hermann 4972* (in herbarium of Frederick J. Hermann at Ann Arbor, Michigan).

Carex illota Bailey

The single flowering specimen cited was collected in the Uinta Mts. in Spruce-Fir forest.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6624.*

Carex interior Rydb.

The single fruiting specimen cited was collected in the west end of the Basin in a wet meadow along a stream in an Aspen-filled valley.

West side of Red Creek, 7500 ft., July 27, 1935, *Graham 9440.*

Carex Kelloggii W. Boott

The single fruiting specimen cited was collected at the edge of a lake in upper Lodgepole Pine Zone of the Uinta Mts.

Lake edge NE. of Paradise Park, 10,000 ft., Aug. 16, 1935, *Graham 10028.*

Carex lanuginosa Michx.

A rather infrequent sedge of moist mid-altitude areas. *Graham 9439* is in flower; the other two specimens show maturing achenes.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6232, Graham 6263;* W. side of Red Creek, 7500 ft., June 27, 1935, *Graham 9439.*

Carex microptera Mack.

The single flowering specimen cited was collected in the west end of the Uinta Mts.

East tributary of Red Creek, 7500 ft., June 26, 1935, *Graham 9395.*

Carex misandra R. Br.

Gilbert Peak (north slope) 12,000 ft., Aug. 24, 1926, *Lambert 29,* USFS 54222. There is also a specimen (*Hermann 5027*) in the herbarium of Frederick J. Hermann, at Ann Arbor, Michigan, collected in late July, 1933, at an alpine lake on the southeast slope of Mt.

Emmons. In Rhodora **36**: 410. 1934, Hermann reported the species from Utah for the first time.

Carex nebraskensis Dewey

A rather frequent sedge throughout the Basin in marshy places of low altitudes. *Graham 9007* and *9134* are immature specimens and questionably determined; *Graham 6229* is in flower; the remaining specimens show maturing achenes. Some of the natives call this plant "Kentucky Blue Grass" and claim it is excellent cattle feed.

Ashley Creek, near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6229*, *Graham 6281;* marsh, mouth of Ashley Creek, 4750 ft., May 30, 1935, *Graham 9007;* head of Deep Channel Creek, Colo., 6700 ft., June 5, 1935, *Graham 9134;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9813*.

Carex Nelsonii Mack.

Gilbert Peak (north slope), 12,500 ft., Aug. 24, 1926, *Lambert 26*, USFS 54224. There are also specimens (*Hermann 5008*, *5043*, *5143*, *5992*) in the herbarium of Frederick J. Hermann, at Ann Arbor, Michigan, collected in late July, 1933, at an alpine pond on the southeast slope of Mt. Emmons.

Carex nigricans C. A. Meyer

A frequent sedge of upper altitude wet meadows, especially in the Spruce-Fir and lower Alpine Zones. Both specimens show flowers.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6583a* (on sheet with *Carex concolor*, *Graham 6583b*); SE. slope of Mt. Emmons, near camp, 11,300 ft., July 19, 1933, *Graham 8508*.

Carex nova Bailey

The single specimen cited is in flower.

Wet, grassy bank of streamlet, alpine meadow at timber line, above Chain Lakes, Krebs Basin, SE. slope of Mt. Emmons, 11,300 ft., July 18, 1933, *Hermann 4952*.

Carex occidentalis Bailey

A frequent sedge throughout the Uinta Mts. in more or less dry situations of upper and mid-altitude forests. *Graham 9404* is immature; *Graham 10081* is in fruit; the other two specimens show flowers.

South of Moon Lake, 8100 ft., June 30, 1931, *Graham 6456a;* Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8022;*

Red Creek, 7500 ft., June 26, 1935, *Graham 9404;* on old landslide, between Paradise Park and Chepeta Lake, 10,300 ft., Aug. 20, 1935, *Graham 10081.*

Carex pelocarpa F. J. Hermann ined.

The type of this species is in the herbarium of Frederick J. Hermann at Ann Arbor, Michigan; it was collected in late July, 1933 on the rocky shore of the fourth Chain Lake on the southeast slope of Mount Emmons (*Hermann 5094*).

Carex petasata Dewey

Collected only near the rim of the Tavaputs Plateau along a stream in a meadow pasture dominated by Sagebrush. *Graham 9569* is in flower; *Graham 9573* is in immature condition.

Willow Springs, 9600 ft., July 10, 1935, *Graham 9569;* Willow Springs, 9500 ft., July 10, 1935, *Graham 9573.*

Carex phaeocephala Piper

Collected only in the Uinta Mts. near tree line. Both specimens are in flower.

Slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6634, Graham 6659.*

Carex physocarpa Presl

A frequent sedge in the muddy margins of glacial lakes in the Lodgepole Pine and Spruce-Fir Zones of the Uinta Mts. *Graham 8410* is an immature specimen questionably determined; the other two numbers show flowers.

Lake edge, E. of Paradise Park, 10,000 ft., July 6, 1933, *Graham 8409* (a form with unusually long perigynium beaks), *Graham 8410;* small lake E. of first Chain Lake, 10,500 ft., July 23, 1933, *Graham 8647.*

Carex podocarpa R. Br.

Grassy bank of cold pond, tundra above timber line (one-fourth mile W. of camp), above Chain Lakes, 11,340 ft., July 19, 1933, *Hermann 4988* (specimens in the herbarium of Frederick J. Hermann at Ann Arbor, Michigan, and California Academy of Sciences).

Carex praegracilis W. Boott

A frequent sedge throughout the Basin in moist areas of low and mid-altitudes. The July specimen shows mature achenes; the other two specimens exhibit flowers.

Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8033b* (on sheet with *Carex vallicola*, *Graham 8033a*); head of Deep Channel Creek, Colo., 6700 ft., June 5, 1935, *Graham 9135;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9808.*

Carex praticola Rydb.

Crevice in boulders, dry rocky shore of fourth Chain Lake, 11,200 ft., July 20, 1933, *Hermann 5096* (specimen in the California Academy of Sciences).

Carex pseudoscirpoidea Rydb.

The single flowering specimen cited was collected at a lake edge near timber line in the Uinta Mts.

Third Chain Lake, 11,000 ft., July 21, 1933, *Graham 8579* (with *Poa leptocoma* Trin.).

Carex Rossii Boott

The single specimen cited shows maturing achenes.

Rocky, alpine meadow at timber line above Chain Lakes, Krebs Basin, SE. slope of Mt. Emmons, 11,300 ft., July 18, 1933, *Hermann 4963.*

Carex rostrata Stokes

A common sedge throughout the Basin in wet places of upper and mid-altitudes. In the Uinta Mts. it is abundant in the shallower water of glacial lakes in the vegetative invasion of which it is a primary factor. The specimens show varying stages of maturity.

South of Moon Lake, 8100 ft., June 30, 1931, *Graham 6432;* up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6528*, *Graham 6548;* edge of lake, E. of Paradise Park, 10,000 ft., July 4, 1933, *Graham 8381;* SW. of Moon Lake, 8100 ft., June 24, 1935, *Graham 9358;* Red Creek, 7500 ft., June 26, 1935, *Graham 9422;* W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9689;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10212.*

Carex Vahlii Schkuhr var. **Stevenii** (Holm) Fernald

Carex alpina Swartz var. *Stevenii* Holm

Carex Halleri of recent authors

A frequent sedge of wet meadows of upper altitude Lodgepole Pine and Spruce-Fir Zones in the Uinta Mts. Both specimens show maturing achenes.

Southwest of Moon Lake, 8100 ft., June 24, 1935, *Graham 9351;* common in wet, mossy, alpine meadow at timber line, above Chain Lakes, Krebs Basin, SE. slope of Mt. Emmons, 11,300 ft., July 21, 1933, *Hermann 5202.*

Carex vallicola Dewey

A frequent sedge throughout the Basin in more or less dry situations of mid-altitude zones. All of the specimens cited show maturing achenes.

Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8033a* (on sheet with *Carex praegracilis, Graham 8033b*); below Mud Springs, 8800 ft., June 29, 1935, *Graham 9477;* Willow Springs, 9600 ft., July 10, 1935, *Graham 9543.*

Eleocharis arenicola Torr.

The single specimen cited, which is in early anthesis, was collected in the swale of a draw among Junipers on the south slope of the Uinta Mts.

Cottonwood Springs, Little Mt., 6600 ft., May 22, 1933, *Graham 7768.*

Eleocharis Bolanderi A. Gray

The single flowering specimen cited was collected in a small, wet meadow along Brown Duck Creek in mixed aspen-pine woodland.

A letter of October 13, 1936 from Dr. H. K. Svenson states that "this is a very interesting occurrence since the species has been known only from California and Oregon. Your specimen from Uinta Basin (No. 9318), and a sheet which I have recently uncovered at the New York Botanical Garden, from the Southwestern corner of Colorado (Dolores, Montezuma County), are the only specimens known outside of California and Oregon."

Southwest of Moon Lake, 8100 ft., June 23, 1935, *Graham 9318.*

Eleocharis calva Torr.

There is a specimen (*Hermann 5299*) of this species, collected on the south slope of the Uinta Mts. in July, 1933, in the herbarium of Dr. Frederick J. Hermann at Ann Arbor, Michigan. The species has apparently not been reported from Utah before and represents a westward extension of range.

Eleocharis macrostachya Britton

A common species throughout the Basin in wet places of low and mid-altitudes. The specimens show varying stages of anthesis with maturing achenes on *Graham 9691* and *9788*. *Graham 7434*, *8981*, and *9011* are atypical.

West side of Green River, near Quarry "L," 4700 ft., June 18, 1931, *Graham 6082*, *Graham 6083;* along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7434;* Dry Fork, in Juniper Zone, 7000 ft., Sept. 5, 1931, *Graham 7443;* in swamp along road, Willow Creek, below mouth of Agency Draw, 5300 ft., May 25, 1935, *Graham 8981;* marsh, mouth of Ashley Creek, 4750 ft., May 30, 1935, *Graham 9011;* head of West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9691;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9788*.

Eleocharis palustris (L.) R. and S. var. **major** Sonder

A plant of Lodgepole Pine or Spruce-Fir Zones in the Uinta Mts., often forming the sole species in the water's edge of glacial lakes. Both specimens are in flower.

Edge of lake, E. of Paradise Park, 10,000 ft., July 6, 1933, *Graham 8416;* edge of lake, NE. of Paradise Park, 10,000 ft., Aug. 16, 1935, *Graham 10025*.

Eriophorum Chamissonis C. A. Meyer

The following specimen of this species, apparently previously unreported from Utah, is in the herbarium of F. J. Hermann at Ann Arbor, Michigan: shore of lake, above timber line, SE. slope of Mt. Emmons, 11,350 ft., July 19, 1933, *Hermann 5015* (also in Mo. Bot. Gard., Gray Herb., and Univ. Wyo.).

Eriophorum polystachion L. See Rhodora **7**: 88. 1905.

Eriophorum angustifolium Roth

Occasional in wet meadows of uppermost Spruce-Fir and treeless Alpine Zones in the Uinta Mts. The August specimen shows maturing achenes; the July specimen is in flower.

Chepeta Lake, 10,600 ft., Aug. 21, 1935, *Graham 10103;* N. of Roberts Pass, NE. slope of Mt. Emmons, 11,300 ft., July 20, 1933, *Doutt s. n.*

Eriophorum Scheuchzeri Hoppe See Rhodora **7**: 82. 1905.

Eriophorum capitatum Host

The single fruiting specimen cited was collected on the wet meadow shore of an Alpine Zone lake in the Uinta Mts. The species is believed to be new to Utah, its range being thus extended southward.

East slope of Mt. Emmons, 11,400 ft., July 18, 1933, *Graham 8459.*

Kobresia Bellardi (All.) Degland

Carex Bellardi All.

Elyna Bellardi (All.) C. Koch

Collected in wet Alpine Zone meadows near timber line in the Uinta Mts. near Mt. Emmons. Both specimens show maturing achenes. Dr. F. J. Hermann and the writer collected the species for the first time in Utah, but Dr. Hermann has already reported its occurrence there (see Rhodora **36**: 410. 1934).

Between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 19, 1933, *Graham 8493;* meadow N. of Chain Lakes, 11,400 ft., July 20, 1933, *Graham 8568.*

Scirpus americanus Pers.

Scirpus pungens Vahl

A frequent plant in moist areas of low and, occasionally, mid-altitudes throughout the central part of the Basin. The specimens show varying stages of anthesis, with maturing achenes on *Graham 9805.*

West side of Green River, near Quarry "L," 4700 ft., June 22, 1931, *Graham 6196;* Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6228;* near alkali pool along Vernal-Island Park road, E. of Brush Creek, 5000 ft., June 12, 1935, *Graham 9206;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9805;* Ainge Gulch, W. of Dinosaur Quarry, June 17, 1912, *Douglass s. n.*

Scirpus occidentalis (S. Wats.) Chase TULE

Scirpus lacustris occidentalis S. Wats.

An infrequent species collected only in swales and marshes along the Green River lowlands between Jensen and Ouray. Near the mouth of Ashley Creek it is the dominant species in very extensive marsh lands where it is associated with *Typha latifolia*, though more abundant than the latter. Both specimens show flowering spikelets.

Between Green River and Quarry "L," 4700 ft., June 19, 1931,

Graham 6133; marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9784.*

Scirpus pallidus (Britton) Fernald

Clay bank of roadside ditch, 1 mi. W. of Vernal, July 27, 1933, *Hermann 5290* (specimens in herbarium of Frederick J. Hermann at Ann Arbor, Michigan, Gray Herbarium and Missouri Botanical Garden).

Scirpus paludosus A. Nels.

The single specimen cited was collected in the extensive Scirpus-Typha marsh along the Green River south of Jensen; it shows flowers and maturing achenes.

Marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9794.*

JUNCACEAE

Juncus albescens (Lange) Fernald

Juncus triglumis var. *albescens* Lange See Rhodora **26**: 201-203. 1924.

The single specimen cited, in early anthesis, was collected in a meadow near timber line in the Uinta Mts.

Between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 19, 1933, *Graham 8490.*

Juncus balticus Willd. var. **montanus** Engelm.

Juncus ater Rydb.

A frequent plant of more or less moist areas throughout the Basin at low and mid-altitudes. The specimens cited are in early anthesis. Two other specimens, too immature for determination, were collected, representing varieties of *J. balticus;* they are *Graham 9136,* collected along Deep Channel Creek, Colo., and *Graham 9446* collected along Red Creek, the latter possibly representing *J. balticus* var. *vallicola* Rydb.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6230;* S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6438;* near alkali pool along Vernal-Island Park road E. of Brush Creek, 5000 ft., June 12, 1935, *Graham 9207.*

Juncus brunnescens Rydb.

This species was collected only in the vicinity of cultivation. The June specimen is in flower; the September number shows mature fruit.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6283;* Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7397.*

Juncus bufonius L.

The single specimen of this Old World species cited was collected in the vicinity of cultivated fields; it shows matured capsules.

Uinta River W. of Lapoint, 5700 ft., July 23, 1933, *Graham 8615.*

Juncus bufonius L. var. **halophilus** Fern. and Buch.

There is a specimen (*Hermann 5271*) of this variety in the herbarium of Frederick J. Hermann at Ann Arbor, Michigan; it was collected in the summer of 1933 along a roadside west of Lapoint.

Juncus castaneus J. E. Smith

The single fruiting specimen of this Eurasian species cited was collected in a patch of Alpine Zone meadow in the Uinta Mts.

Head of W. Fork of Whiterocks River, 12,000 ft., Aug. 21, 1935, *Graham 10122.*

Juncus Drummondii E. Meyer

A common species of wet meadows along streams or lake edges from the Lodgepole Pine to the Alpine Zone in the Uinta Mts. *Graham 6604, 8183* and *8510* are in anthesis; the other specimens exhibit matured capsules.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6604;* Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8183;* E. of Paradise Park, 10,000 ft., July 4, 1933, *Graham 8382;* SE. slope of Mt. Emmons, near camp, 11,300 ft., July 19, 1933, *Graham 8510;* NE. of Paradise Park, 10,000 ft., Aug. 16, 1935, *Graham 10040;* Chepeta Lake, 10,600 ft., Aug. 20, 1935, *Graham 10073;* head of W. Fork of Whiterocks River, 12,000 ft., Aug. 21, 1935, *Graham 10119;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10205.*

Juncus Dudleyi Wiegand

There is a specimen (*Hermann 5297*) of this species in the herbarium of Frederick J. Hermann at Ann Arbor, Michigan; it was collected in the summer of 1933 along a roadside ditch one mile west of Vernal.

Juncus ensifolius Wikstr.

Wet border of pond, clearing in Aspens on trail to Chain Lakes, 8300 ft., July 23, 1933, *Hermann 5267* (specimens in the herbarium

of Frederick J. Hermann at Ann Arbor, Michigan, Gray Herbarium, Missouri Botanical Garden, and the Rocky Mountain Herbarium at Laramie, Wyoming).

Juncus longistylis Torr.

An infrequent species throughout the Basin in moist places of mid-altitudes. Both specimens show flowers.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6282;* Willow Springs, 9500 ft., July 11, 1935, *Graham 9598.*

Juncus Mertensianus Bong.

A frequent species of moist areas of the upper forested zones in the Uinta Mts. *Graham 8383* and *8646* show flowers; the other numbers exhibit maturing capsules.

Up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6563;* E. of Paradise Park, 10,000 ft., July 4, 1933, *Graham 8383;* E. of first Chain Lake, 10,500 ft., July 23, 1933, *Graham 8646;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10218.*

Juncus nodosus L.

The single fruiting specimen cited was collected in the vicinity of a cultivated field.

Uinta River, W. of Lapoint, 5700 ft., July 23, 1933, *Graham 8617.*

Juncus Parryi Engelm.

Collected only in the west end of the Uinta Mts. at the edge of a lake in mixed Lodgepole Pine-Engelmann's Spruce forest. The specimen shows opened capsules.

Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10244.*

Juncus saximontanus A. Nels.

The single specimen cited was collected in the vicinity of a cultivated field; it shows old flowers and immature fruits.

Dry Fork, in Juniper Zone, 7000 ft., Sept. 5, 1931, *Graham 7444.*

Juncus Torreyi Coville

The single specimen cited, showing old flowers and immature fruit, was collected on the clay bank of an irrigation ditch along the roadside.

One mile west of Vernal, 5325 ft., July 27, 1933, *Hermann 5298.*

Juncus xiphioides E. Meyer var. **montanus** Engelm. sens. lat.

? *Juncus Tracyi* Rydb.

A rather frequent species throughout the Basin in moist areas of low and mid-altitudes. *Graham 9645* is immature; the other specimens possess mature capsules.

Head of W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9645;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9883;* Ainge Gulch, W. of Dinosaur Quarry, June 17, 1912, *Douglass s. n.*

Luzula Piperi (Coville) Henry

Juncoides Piperi Coville

The single fruiting specimen cited was collected in a marshy clearing. The species is here reported from Utah for the first time, its range thus being extended to the southeast.

N. end of fourth Chain Lake, Krebs Basin, SE. slope of Mt. Emmons, 11,200 ft., July 20, 1933, *Hermann 5106.*

Luzula spicata (L.) DC.

Juncoides spicatum (L.) Kuntze

The single flowering specimen of this Eurasian species cited was collected in a meadow patch near timber line in the Uinta Mts.

SE. slope of Mt. Emmons near camp, 11,300 ft., July 19, 1933, *Graham 8512.*

LILIACEAE

Allium acuminatum Hook.

A frequent species of dry, open situations of mid-altitudes in the Uinta Mts. Both specimens show mature capsules with dried flowers persisting.

Southeast slope of Mosby Mt., 8000 ft., July 3, 1933, *Graham 8350;* 10 mi. S. of Moon Lake, E. side of West Fork, above mouth of East Fork (Yellowstone) Creek, 6900 ft., June 22, 1935, *Graham 9294.*

Allium brevistylum S. Wats.

A frequent species of upper and mid-altitude woodlands in the Uinta Mts. The June specimens are in flower; the August numbers are in fruit.

South of Moon Lake, 8100 ft., June 30, 1931, *Graham 6437;* SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9332;* NE. of Paradise Park, 10,000 ft., Aug. 16, 1935, *Graham 10024;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Allium nevadense S. Wats.

A sparse species of dry slopes at low altitudes throughout the Basin. Both specimens are in flower.

East of Willow Creek, Thorne's ranch, 5800 ft., May 22, 1935, *Graham 8924;* Red Wash above Island Park, 5200 ft., June 10, 1935, *Graham 9150.*

Allium textile Nels. and Macbr. See Bot. Gaz. **56**: 470. 1913.

Allium reticulatum Fraser, not Presl

A common onion through the Basin in dry situations of low altitudes, especially in the Mixed Desert Shrub Zone. The specimens cited show varying stages of flower and fruit.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6102;* along Brush Creek W. of Dinosaur Quarry, 5000 ft., May 16, 1933, *Graham 7679;* hills E. of Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7683;* Skull Pass Quarry, 5000 ft., May 18, 1933, *Graham 7822;* Pariette Mine, 10 mi. SE. of Myton, 5000 ft., May 26, 1933, *Graham 7856;* talus slope S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7891;* bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7929;* N. side of White River, 4 mi. NE. of mouth of Evacuation Creek, 5300 ft., May 7, 1935, *Graham 8776;* N. side of White River, 4 mi. NE. of mouth of Evacuation Creek, 5300 ft., May 8, 1935, *Graham 8786;* S. slope of Leland Bench, 5000 ft., May 13, 1935, *Graham 8820;* rocky bench, Uteland Mine, 4800 ft., May 17, 1935, *Graham 8897;* W. of Bitter Creek, Vernal-Watson road, 6000 ft., May 27, 1935, *Graham 9003;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6000 ft., May 31, 1935, *Graham 9048;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.*

Brodiaea capitata Benth.

Dipterostemon capitatus (Benth.) Rydb.

The specimen cited, which is in early anthesis, was collected at the west end of the Basin under Aspens.

Horse Creek, 7700 ft., June 18, 1935, *Graham 9233a.*

Brodiaea Paysonii A. Nels.

Androstephium breviflorum S. Wats.

A frequent species of dry situations in the low altitude Mixed Desert Shrub Zone throughout the Basin. The specimens are in

flower except *Graham 7901*, *8881* and *8925*, which show maturing capsules.

Flat SE. of Jensen, 5000 ft., May 5, 1933, *Graham 7602;* bad lands N. of Skull Pass Quarry, 5000 ft., May 9, 1933, *Graham 7626;* hills E. of Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7709;* bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7901;* 9 mi. SSE. of Vernal, 5000 ft., May 2, 1935, *Graham 8741;* bench W. of Green River, S. of Uteland Butte, 4800 ft., May 16, 1935, *Graham 8881;* E. of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8925*.

Calochortus Gunnisonii Wats.

A species apparently confined to the Tavaputs Plateau where it was collected in Sagebrush among patches of Aspen. *Graham 9625* is in bud but probably referable to this species; *Graham 9717* is in flower and *Graham 9832* is in flower with immature capsules.

East rim of Range Creek, near Willow Springs, 9700 ft., July 13, 1935, *Graham 9625;* middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9717;* ridge W. of head of Post Canyon, 8000 ft., July 27, 1935, *Graham 9832*.

Calochortus Nuttallii Torr. SEGO LILY

Frequent throughout the Basin in dry areas of low and mid-altitudes. It is the Utah State flower, its bulbous corms having been much used for food by early settlers. All of the specimens are in flower except *Graham 8305a*, which is a collection of mature capsules only, while *Graham 6361*, *8166* and *9158* show both flowers and maturing capsules. No attempt has been made to separate the species listed into segregates of the *Calochortus Nuttallii* complex, although some, such as *Graham 8353*, seem to agree closely with Rydberg's *Calochortus acuminatus*. See Bull. Torr. Club **24**: 189. 1897.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6328*, *Graham 6361;* Vernal-Manila road, N. of Vernal, 6500 ft., June 19, 1933, *Graham 8166;* desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8305a;* SE. slope of Mosby Mt., 8000 ft., July 3, 1933, *Graham 8353;* desert 15 mi. S. of Jensen, 5500 ft., May 27, 1935, *Graham 9000;* 10 mi. E. of Jensen along highway U. S. 40, 5000 ft., May 31, 1935, *Graham 9029;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9076;* bench 5 mi. E. of Vernal, Diamond Mt. road, 5500 ft., June 8, 1935, *Graham 9139;*

Red Wash above Island Park, 5200 ft., June 10, 1935, *Graham 9158;* hills and ravines E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Erythronium parviflorum (S. Wats.) Goodding DOG-TOOTH VIOLET

Erythronium grandiflorum parviflorum S. Wats.

A species collected only from the extreme west end of the Uinta Mts. where it occurs in open areas of upper altitudes. The June specimen is in flower; the September number is in fruit. There is also a specimen (*Sweadner s. n.*) from the west slope of the Basin, near Snyderville.

East side of Wolf Creek Pass, 9000 ft., June 16, 1933, *Graham 8148;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10242.*

Fritillaria atropurpurea Nutt. TIGER or LEOPARD LILY

An infrequent species of dry Aspen woods or mid-altitude Sagebrush areas throughout the Basin. All the specimens are in flower except *Graham 9868,* which shows mature capsules.

Near Little Lake, 8500 ft., June 22, 1933, *Graham 8228;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9489;* Willow Springs, 9600 ft., July 10, 1935, *Graham 9568;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9868.*

Lloydia serotina (L.) Sweet ALP LILY

The single flowering specimen of this Eurasian species cited was collected in the Uinta Mts. in the Alpine Zone.

Ridge NNW. of Paradise Park, 10,800 ft., July 8, 1933, *Graham 8431.*

Smilacina amplexicaulis Nutt.

Vagnera amplexicaulis (Nutt.) Greene

An infrequent species throughout the Basin in mid-altitude woodlands and river valleys. The late July specimen is in fruit; the others bear flowers.

Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 8001;* middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9734;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9858.*

Smilacina stellata (L.) Desf.

Vagnera stellata (L.) Morong

A common plant of moist, usually shaded places of lower and mid-altitudes throughout the Basin, especially on the shaded flood-plains

of the larger streams. All of the plants are here considered to be a scarcely distinguishable western form of *Smilacina stellata*. *Graham 8629* bears fruit only; the other specimens show flowers with *Graham 6194* and *9188* bearing fruit also.

West side of Green River near Quarry "L," 4700 ft., June 22, 1931, *Graham 6194;* S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6421;* N. of Dinosaur Quarry, 5500 ft., May 18, 1933, *Graham 7720;* along Green River, S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7897;* W. side of Uinta River at sheep bridge, 8500 ft., July 23, 1933, *Graham 8629;* E. side of Green River, Island Park, 4950 ft., June 11, 1935, *Graham 9188;* Horse Creek, 7700 ft., June 18, 1935, *Graham 9267;* E. rim of Range Creek, near Willow Springs, 9700 ft., July 13, 1935, *Graham 9626;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9894;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.*

Streptopus amplexifolius (L.) DC. var. **chalazatus** Fassett See Rhodora **37**: 97. 1935. TWISTED STALK

The single fruiting specimen cited was collected in the west end of the Uinta Mts. where it was growing in mixed Lodgepole-Spruce woods on the west side of Mirror Lake.

Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10204.*

Veratrum californicum S. Wats., not Durand WHITE or FALSE
Veratrum Jonesii Heller HELLEBORE, SKUNK CABBAGE
Veratrum speciosum Rydb.

An infrequent species of moist, open places in upper altitude forests of the Uinta Mts. The early July specimen shows flower buds; the other specimens are vegetative.

Although not readily eaten by stock, Hellebore is poisonous and may cause convulsions and death. After it is frosted, sheep find it harmlessly palatable.

Between Moon Lake and Brown Duck Lake, 9500 ft., July 2, 1931, *Graham 6671;* between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 20, 1933, *Graham 8532;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10213.*

Yucca Harrimaniae Trelease

An infrequent but widely distributed species throughout the Basin at low altitudes. *Graham 7888* is in bud; *6413* shows flowers and im-

mature fruit; *8269a* and *9275* are in flower; *9966* is in mature fruit, while *7887* shows capsules of the preceding season.

Juniper Zone below Moon Lake, 7500 ft., June 30, 1931, *Graham 6413;* talus slope, S. of mouth of Sand Wash., 4500 ft., May 27, 1933, *Graham 7887*, *Graham 7888;* Duchesne River Canyon, 7000 ft., June 16, 1933, *Graham 8269a;* N. side of Strawberry River, 5 mi. below mouth of Red Creek, 6100 ft., July 19, 1935, *Graham 9275;* Desolation Canyon above mouth of Florence Canyon, 4500 ft., Aug. 2, 1935, *Graham 9966.*

Zygadenus elegans Pursh MOUNTAIN DEATH CAMAS

Anticlea elegans (Pursh) Rydb.

A frequent species throughout the upper altitudes of the Uinta Mts. in dry woods or in meadows near timber line. *Graham 8399* and *8419* are in bud; the other specimens are in flower, except *10066*, which bears maturing capsules.

Unlike the following species, this one is only slightly poisonous and probably never causes serious damage to stock on the range.

West of Moon Lake, 8100 ft., July 1, 1931, *Graham 6474;* Blanchard Park, head of Dry Fork Creek, 10,000 ft., July 5, 1933, *Graham 8399;* ridge NNW. of Paradise Park, 10,500 ft., July 8, 1933, *Graham 8419;* W. side of Marsh Peak, 11,000 ft., July 10, 1933, *Graham 8452;* between E. ridge of Mt. Emmons and Chain Lakes, 11,400 ft., July 20, 1933, *Graham 8575;* SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9321;* Lodgepole Pine woods near Paradise Park road, east of Whiterocks River Canyon, between Red Pine and Paradise Creeks, 9800 ft., Aug. 17, 1935, *Graham 10066;* Diamond Mt., 8000 ft., Aug. 5-7, 1912 *Douglass s. n.*

Zygadenus paniculatus S. Wats. FOOTHILL DEATH CAMAS, POISON SEGO

A frequent and widely distributed species throughout the Basin at low and mid-altitudes, particularly in Sagebrush areas. All of the specimens show flowers, except the July numbers, which bear mature capsules.

Although this species is especially prominent in early Spring before many other forage plants appear, we have observed that sheep will often avoid it, the fresh, somewhat succulent leaves often remaining untouched by grazing sheep. It is an extremely poisonous plant which affects all animals of the range, and it is also fatal to man.

All parts of the plant are poisonous, although the exact nature of the toxin is unknown. In the Uinta Basin sheep apparently suffer most from this plant. There is no reliable remedy.

Ten miles SW. of Vernal, 5000 ft., May 3, 1933, *Graham 7597;* 5 miles NW. of Dinosaur Quarry, 5500 ft., May 16, 1933, *Graham 7667;* junction of juniper and aspen zones, Uinta River Canyon, 7000 ft., June 2, 1933, *Graham 8063;* near Little Lake, 8300 ft., June 23, 1933, *Graham 8264;* SE. slope of Mosby Mt., 8000 ft., July 3, 1933, *Graham 8358;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6000 ft., May 31, 1935, *Graham 9042;* middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9718;* Post Canyon, 8000 ft., July 27, 1935, *Graham 9847;* Post Canyon, 8000 ft., June 1, 1935, *Thorne s. n.*

IRIDACEAE

Iris missouriensis Nutt. BLUE FLAG

An infrequent plant in the Uinta Basin where it occurs in wet meadows along streams or in moist woods of low and mid-altitudes. *Graham 8042* is in flower; *Graham 8126* shows old capsules; *Graham 8456* exhibits flowers and capsules of the preceding season. It was also collected (*Graham 10198*, Wyoming) in an open swale among Sagebrush on the north side of the Uinta Mts.

Along Uinta River E. of Hayden, 5700 ft., June 2, 1933, *Graham 8042;* meadow N. of Diamond Gulch, Diamond Mt., 7500 ft., June 7, 1933, *Graham 8126;* S. face of Mosby Mt., 8500 ft., July 10, 1933, *Graham 8456.*

Sisyrinchium occidentale Bickn. BLUE-EYED GRASS

A frequent species in moist grassy areas of low and mid-altitudes in the Uinta Mts. All of the specimens show varying stages of flower and fruit.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6284;* up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6562;* along Uinta River E. of Hayden, 5700 ft., June 2, 1933, *Graham 8041;* Uinta River along Lapoint-Neola road, 5700 ft., June 22, 1935, *Graham 9301;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

ORCHIDACEAE

The names and synonymy in this family are after Ames (1924).

Amnesia gigantea (Dougl.) A. Nels. and Macbride
Epipactis gigantea Dougl.
Serapias gigantea (Dougl.) A. A. Eaton

Collected only in the vicinity of the Dinosaur National Monument. *Graham 7831b* is in bud; the other specimen is in flower.

Split Mt. Canyon, 5000 ft., May 25, 1933, *Graham 7831b;* Ainge Gulch, 5 mi. N. of Jensen, May 29, 1912, *Peterson s. n.*

Calypso bulbosa (L.) Oakes — CALYPSO, CYTHEREA, HIDER OF THE NORTH
Calypso borealis Salisb.
Cypripedium bulbosum L.
Cytherea bulbosa (L.) House

The single flowering specimen of this European species cited was collected on the south slope of the Uinta Mts.

West side of Farm Creek, 7500 ft., June 23, 1933, *Graham 8269b.*

Corallorrhiza maculata Raf. — CORAL ROOT
Corallorrhiza multiflora Nutt.

A fairly frequent species in Aspen woodlands of the Uinta Mts. *Graham 6357* and *7978* show matured capsules; the other two specimens are in flower.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6357;* Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7978;* SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9341;* SW. of Moon Lake, 8100 ft., June 24, 1935, *Graham 9343.*

Corallorrhiza Mertensiana Bong.

The single specimen cited was collected on the southeastern Tavaputs Plateau among Aspens; it shows fruit only and is questionably determined.

One mile W. of Baxter Pass, Colo., 8300 ft., Aug. 29, 1935, *Graham 10153.*

Corallorrhiza striata Lindl.

Collected only in the most southern reaches of the Tavaputs Plateau. Both specimens show maturing fruit.

Post Canyon, 7800 ft., July 28, 1935, *Graham 9859;* head of Hill Creek, 8500 ft., July 31, 1935, *Graham 9950.*

Cypripedium fasciculatum Kellogg

This specimen apparently represents the first record of the species in Utah, and the easternmost limit of its range.

Head of Mill Canyon Ridge, 9000 ft., June 10, 1926, *Woods and Walkup 39*, USFS 54265.

Habenaria dilatata (Pursh) Hook.

Habenaria borealis Cham.
Limnorchis borealis (Cham.) Rydb.
Limnorchis dilatata (Pursh) Rydb.
Orchis dilatata Pursh

Graham 10231 was collected in the grass of a rocky meadow in the lower Spruce-Fir Zone. Both specimens show flowers and young capsules.

Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10231;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Habenaria hyperborea (L.) R. Br.

Habenaria borealis var. *viridiflora* Cham.
Limnorchis viridiflora (Cham.) Rydb.

A rather frequent orchid in moist areas of mid-altitudes in the Uinta Mts. The June and July specimens are in flower; *Graham 7402* is in fruit and *Graham 7486* is a depauperate plant questionably referred to this species.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6267;* Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7402;* Davis Hollow, Taylor Mt., 8700 ft., Sept. 7, 1931, *Graham 7486;* where sheep bridge crosses Uinta River, 8500 ft., July 17, 1933, *Graham 8456x.*

Spiranthes Romanzoffiana Cham. HOODED LADIES' TRESSES

Ibidium Romanzoffianum House
Ibidium strictum House
Spiranthes stricta A. Nels.

The single flowering specimen cited was collected in a wet meadow among mixed Lodgepole Pine and Spruce in the Uinta Mts.

Paradise Park, 10,000 ft., Aug. 16, 1935, *Graham 10048.*

SALICACEAE

Populus angustifolia James NARROW LEAF or BLACK COTTONWOOD
Populus coloradensis Dode
Populus fortissima Nels. and Macbr.

An infrequent tree in the Basin where it is confined to the more narrow stream valleys of low altitudes. Unlike the more common *Populus Sargentii*, it does not occur along the broad, open, more mature flood-plains of the larger streams. The 1931 specimens are both vegetative; those of 1933 show immature pistillate catkins, the April on leafless, the May on leafy twigs, while the June, 1935 sheet exhibits leaves and mature capsules.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6254*, *Graham 6256;* Dinosaur Quarry, 5000 ft., April 28, 1933, *Graham 7558;* Cottonwood Springs, Little Mt., 6600 ft., May 22, 1933, *Graham 7782;* N. side of Strawberry River, 5 mi. below mouth of Red Creek, 6100 ft., June 19, 1935, *Graham 9271*.

Populus aurea Tidestrom ASPEN, TREMBLING ASPEN, QUAKER
Populus tremuloides var. *aurea* (Tidestrom) Daniels
Populus tremuloides var. *scopulorum* Tidestrom ined.

The Aspen is the dominant tree between the altitudes of 8000 and 8700 feet on the south slopes of the Uinta Mts. where it forms a distinct altitudinal zone between the Sub-montane Shrub Zone below and the Lodgepole Pine Zone above. In places this zone is interrupted by an upward extension of the Sub-montane Shrub Zone and occasionally, as at Moon Lake, Yellow Pine may usurp the position of the Aspen. In the Tavaputs Plateau, the Aspen occurs from an altitude of 7500 feet to the broad summits of the uplift at 10,000 feet, throughout which altitudinal extension it may occur in solid patches or be mixed indiscriminately with components of the Sub-montane Shrub or, especially on the uppermost northern exposures, with Alpine Fir. The species is not confined to these altitudinal limits, however, as evidenced by the collection of a dwarfed specimen, *Graham 6646*, at timber line in the Uinta Mts. The Aspen is quick to populate burned over areas and often reaches into higher zones, especially the Lodgepole Pine Zone, where fires have created openings. It sometimes becomes a large tree and, although the bark is usually light-colored, smooth, and powdery, on old trees, as one we observed at Moon Lake, the bark for several feet from the ground was dark,

almost black, and deeply furrowed between irregular rough blocks. This tree measured, breast-high, 5 feet in circumference. The 1931 specimens are vegetative; those of 1933 show immature pistillate catkins on leafless twigs except *Graham 8072* which exhibits maturing capsules on leafy branches; that of 1935 shows maturing capsules on leafy branches (seeds are freed in mid-July).

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6381;* slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6646;* Davis Hollow, Taylor Mt., 8700 ft., Sept. 7, 1931, *Graham 7472;* Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7800, Graham 7803;* Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8007;* near spring, S. slope of Diamond Mt., 6000 ft., June 5, 1933, *Graham 8072;* Horse Creek, 7700 ft., June 18, 1935, *Graham 9252.*

Populus Sargentii Dode WESTERN or RIVER COTTONWOOD

Populus occidentalis Rydb.

The common Cottonwood along the mature flood-plains of the larger streams throughout the Basin and by far the commonest deciduous tree of low altitudes. *Graham 7319* is one of many thousand seedlings growing in the muddy shore of the Green River which would be deeply inundated the following Spring; *Graham 6085* and *6210* show mature, opened capsules; *Graham 7540, 7618, 8753, 8784* and *8908* show varying stages of staminate catkins; the remaining numbers show young pistillate catkins.

This tree flowers in early May, comes into leaf in late May, and produces cottony seeds which are matured in mid- or late June. Along the muddy river shores the seeds have germinated and developed into seedlings 6 to 10 inches high by early September, most of which will be drowned by the floods of the following Spring. It is a large tree, and one at Ruple's ranch along Green River in Island Park measured, breast-high, 19 feet 6 inches in circumference.

West side of Green River near Quarry "L," 4700 ft., June 18, 1931, *Graham 6085;* W. side of Green River near Quarry "L," 4700 ft., June 22, 1931, *Graham 6210;* W. side of Green River near Quarry "L," 4700 ft., Aug. 29, 1931, *Graham 7319;* along Green River, S. of Jensen, 4750 ft., April 27, 1933, *Graham 7540, Graham 7541;* along Green River near Skull Pass Quarry, 4700 ft., May 6, 1933, *Graham 7617, Graham 7618;* along Green River, S. of Jensen, 4750 ft., May 2, 1935, *Graham 8752, Graham 8753;* N. side of White River, 4 mi. NE.

of mouth of Evacuation Creek, 5000 ft., May 8, 1935, *Graham 8783*, *Graham 8784;* W. side of Green River, Uteland Mine, 4800 ft., May 17, 1935, *Graham 8906;* along Green River, S. of Uteland Mine, 4750 ft., May 18, 1935, *Graham 8908.*

Salix amygdaloides Ands. PEACH-LEAVED WILLOW

With *Salix exigua*, this tree forms the willow thickets so abundant along the larger streams at low altitude throughout the Basin. *Graham 8910* and *9027* show young pistillate catkins; *Graham 6090*, *6091*, *6204*, *6211*, and *Douglass s. n.* exhibit mature fruiting catkins; the remaining numbers possess staminate catkins.

West side of Green River near Quarry "L," 4700 ft., June 18, 1931, *Graham 6081*, *Graham 6090*, *Graham 6091;* W. side of Green River near Quarry "L," 4700 ft., June 22, 1931, *Graham 6204*, *Graham 6211;* along Green River S. of Uteland Mine, 4700 ft., May 18, 1935, *Graham 8909*, *Graham 8910*, *Graham 8911;* draw E. of Willow Creek, near school house, 5300 ft., May 24, 1935, *Graham 8969;* marsh, mouth of Ashley Creek, 4750 ft., May 30, 1935, *Graham 9027*, *Graham 9028;* White River bottom near Utah-Colorado state line, July 6, 1908, *Douglass s. n.* (with *Salix ligulifolia*); White River, June 26, 1912, *Peterson s. n.;* White River, June 28, 1912, *Peterson s. n.* (The two latter specimens have their catkins infested with gall mites.)

Salix Bebbiana perrostrata (Rydb.) Schn. BEAKED WILLOW

A frequent willow of stream sides in mid-altitudes of the Uinta Mts. *Graham 8237* shows immature capsules; the other specimens possess mature capsules.

Near Little Lake, 8300 ft., June 23, 1933, *Graham 8237;* along Red Creek, 7500 ft., June 26, 1935, *Graham 9435;* W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9680.*

Salix cascadensis Cockerell

A frequent dwarf willow of moist meadow patches in the Alpine Zone near and above timber line in the Uinta Mts. *Graham 8451* shows staminate catkins; the other specimens possess mature capsules.

On meadow terrace, W. slope of Marsh Peak, 11,000 ft., July 10, 1933, *Graham 8451;* E. slope of Mt. Emmons, 11,300 ft., July 18, 1933, *Graham 8474a;* between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 19, 1933, *Graham 8491;* head of W. Fork of Whiterocks River, 12,000 ft., Aug. 21, 1935, *Graham 10131.*

Salix caudata Bryantiana Ball and Bracelin ined.

A frequent willow along streams of low and mid-altitudes in the Uinta Mts. It was also collected (*Graham 9215*) on the west slope of the Basin in Daniel's Canyon. *Graham 8046* shows staminate catkins; the other specimens possess maturing capsules.

Up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6524, Graham 6530;* along Uinta River E. of Hayden, 5700 ft., June 2, 1933, *Graham 8046;* low ridge just below Moon Lake, 8000 ft., June 25, 1935, *Graham 9371.*

Salix exigua Nutt. SANDBAR WILLOW

With *Salix amygdaloides* this species forms the common willow thickets along the banks and islands of the larger streams throughout the Basin. *Graham 6209* is a vegetative specimen; *Graham 7614* is a specimen in winter condition; both show cone galls. *Graham 6207, 7744, 7754, 7780, 7896,* and *8045* show various stages of staminate catkins; the remaining numbers exhibit various stages of pistillate catkins, from young to mature condition.

West side of Green River near Quarry "L," 4700 ft., June 18, 1931, *Graham 6080;* W. side of Green River near Quarry "L," 4700 ft., June 22, 1931, *Graham 6206, Graham 6207, Graham 6209;* along Green River, near Skull Pass Quarry, 5000 ft., May 6, 1933, *Graham 7614;* between Dinosaur Quarry and Green River, 4800 ft., May 19, 1933, *Graham 7744;* Orchid (Mud) Springs Canyon, 5000 ft., May 20, 1933, *Graham 7754;* Cottonwood Springs, Little Mt., 6600 ft., May 22, 1933, *Graham 7780;* along Green River, S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7895, Graham 7896;* along Uinta River E. of Hayden, 5700 ft., June 2, 1933, *Graham 8045;* along Willow Creek below Agency Draw, 5200 ft., May 25, 1935, *Graham 8982;* E. side of Green River, Island Park, 5000 ft., June 11, 1935, *Graham 9191;* Uinta Basin, July 11, 1912, *Peterson s. n.;* Uinta Basin, July 13, 1912, *Peterson s. n.*

Salix exigua stenophylla (Rydb.) Schn.

Collected only at the locality cited. The specimen exhibits mature capsules.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6237.*

Salix flavescens Nutt.

Salix Nuttallii Sarg.
Salix Scouleriana Barratt

Although the single specimen cited is vegetative, its distinctive leaves permit little doubt that it should be referred to this species.

Davis Hollow, Taylor Mt., 8700 ft., Sept. 7, 1931, *Graham 7488.*

Salix Geyeriana Ands.

An infrequent willow of stream sides in mid-altitudes of the Uinta Mts. *Graham 7973* shows staminate catkins; the other May specimen exhibits immature, the July mature, capsules.

Up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6547;* Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7973, Graham 7974.*

Salix lasiandra Benth.

An infrequent willow of low and mid-altitude stream sides in the Uinta Mts. *Graham 9423* shows maturing, the other number matured, capsules.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6227;* along road, Red Creek valley, 7500 ft., June 26, 1935, *Graham 9423.*

Salix ligulifolia Ball

See *Salix amygdaloides, Douglass s. n.* (a vegetative specimen).

Salix lutea Nutt. YELLOW WILLOW

A frequent willow of low altitudes along streams of the lower Uinta Mts. It was also collected (*Graham 8086*) on the north slope of the Uinta Mts. in Jackson Draw. *Graham 7802* shows staminate catkins; the other May specimens show immature and maturing pistillate catkins, while the two June specimens possess mature capsules.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6238;* 3 mi. W. of Dinosaur Quarry, 5500 ft., May 15, 1933, *Graham 7652;* spring along Brush Creek, W. of Dinosaur Quarry, 5000 ft., May 16, 1933, *Graham 7682;* Douglass Canyon, W. of Dinosaur Quarry, 5000 ft., May 19, 1933, *Graham 7726;* Orchid (Mud) Springs, W. of Dinosaur Quarry, 5000 ft., May 20, 1933, *Graham 7755;* Cottonwood Springs, Little Mt., 6600 ft., May 22, 1933, *Graham 7774;* Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7801, Graham 7802;* White River, June 26, 1912, *Peterson s. n.*

Salix melanopsis Nutt.

Yellowstone, Duchesne County, 8000 ft., June 24, 1928, *Weight 17*, USFS 61137.

Salix monticola Bebb

An infrequent willow of low altitude or occasionally mid-altitude canyons in the Uinta Mts. *Graham 7549* shows staminate flowers; the other specimens exhibit pistillate catkins.

Dinosaur Quarry Canyon, 5000 ft., April 28, 1933, *Graham 7549*, *Graham 7550;* Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7975*.

Salix petrophila Rydb. ROCK WILLOW

Collected only at the locality cited in a meadow patch among rocks in the Alpine Zone of the Uinta Mts. well above the trees. The specimen shows mature capsules.

Head of W. Fork of Whiterocks River, 12,000 ft., Aug. 21, 1935, *Graham 10128*.

Salix planifolia Pursh

A frequent low willow of upper altitudes in the Uinta Mts., especially in moist, open meadows or along streams in the Lodgepole Pine or Spruce-Fir Zones. It occurs also in distinct zones around certain glacial lakes and in thickets above tree line. In its alpine form, as represented by our specimens, this plant may be considered varietal, as Schneider regarded it, calling it var. *monica*. *Graham 8190* shows staminate catkins; the other specimens show maturing capsules.

Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8189*, *Graham 8190;* near lake edge, Paradise Park, 10,000 ft., July 6, 1933, *Graham 8417;* between E. ridge of Mt. Emmons and Chain Lakes, 11,400 ft., July 20, 1933, *Graham 8564*.

Salix pseudocordata (Ands.) Rydb.

Salix curtiflora Ands.

Salix pseudomyrsinites Ands.

A frequent willow throughout the Basin in moist areas of mid- and sometimes upper altitudes, in places forming thickets along streams. *Graham 9234* shows staminate catkins. The other mid-June specimens exhibit maturing pistillate catkins while the late June and July sheets show mature capsules.

South of Moon Lake, 8100 ft., June 30, 1931, *Graham 6429;* E. side of Wolf Creek Pass, 9400 ft., June 16, 1933, *Graham 8131;* Horse Creek, 7700 ft., June 18, 1935, *Graham 9234, Graham 9241;* W. side of Red Creek, in meadow, 7500 ft., June 27, 1935, *Graham 9442;* Willow Springs, 9550 ft., July 10, 1935, *Graham 9532.*

Salix pseudocordata aequalis (Ands.) Ball

An infrequent willow of upper and mid-altitudes of the Uinta Mts. *Graham 8204,* which shows pistillate flowers, was collected at the edge of a high glacial lake which was filling with vegetation; *Graham 8236,* which shows mature capsules, was collected along a creek in an open meadow among Aspens.

West Northwest of Trout Creek Ranger Station, 10,300 ft., June 21, 1933, *Graham 8204;* near Little Lake, 8300 ft., June 23, 1933, *Graham 8236.*

Salix pseudolapponum von Seemen

Salix glaucops Ands.

A frequent willow of upper altitudes in the Uinta Mts. where it grows in meadows and on rocky moraines. In places it is the dominant shrub along open meadow creeks near timber line. *Graham 10093* shows staminate catkins; the early July specimen shows immature capsules while the late July and August specimens exhibit mature capsules.

Slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6641;* between E. ridge of Mt. Emmons and Chain Lakes, 11,300 ft., July 20, 1933, *Graham 8518;* between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 20, 1933, *Graham 8558;* between Paradise Park and Chepeta Lake, 10,000 ft., Aug. 20, 1935, *Graham 10091;* between Paradise Park and Chepeta Lake (with *Graham 10092, Salix Wolfii,* forming dominant shrubs in winding creek meadow), 10,000 ft., Aug. 20, 1935, *Graham 10093;* in woods, edge of wet swale near Queant Lake, 10,500 ft., Aug. 22, 1935, *Graham 10135.*

Salix saximontana Rydb.

Anderson's Pass, Duchesne County, 12,500 ft., July 17, 1928, *Weight 115,* USFS 61148.

Salix subcoerulea Piper BLUE WILLOW

A frequent willow throughout all the altitudinal zones of the Uinta Mts. It occurs along streams of the Mixed Desert Shrub Zone and

surrounds glacial lakes which are filling with vegetation in the Spruce-Fir Zone. *Graham 7615* shows leafless twigs in winter condition; *Graham 7993*, *8132* and *8205* show staminate catkins; *Graham 8006* shows pistillate flowers and *9317* shows mature capsules.

Along Green River, near Skull Pass Quarry, 5000 ft., May 6, 1933, *Graham 7615;* Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7993*, *Graham 8006;* E. side of Wolf Creek Pass, 9400 ft., June 16, 1933, *Graham 8132;* WNW. of Trout Creek Ranger Station (along edge of lake filling with vegetation), 10,300 ft., June 21, 1933, *Graham 8205;* SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9317*.

Salix Wolfii Bebb

A single vegetative specimen was collected at the locality cited.

With *Graham 10093*, *Salix pseudolapponum*, forming dominant shrubs in winding creek meadow, between Paradise Park and Chepeta Lake, 10,000 ft., Aug. 20, 1935, *Graham 10092*.

BETULACEAE

Alnus tenuifolia Nutt. RIVER ALDER

Alnus incana virescens S. Wats.

An infrequent shrub along streams in low and mid-altitude valleys of the Uinta Mts. *Graham 6259* and *6425* are vegetative specimens; the others show pistillate catkins and old fruit.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6259;* S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6425;* up creek, N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6531*, *Graham 6564;* Uinta River along Lapoint-Neola road, 5700 ft., June 22, 1935, *Graham 9296*.

Betula fontinalis Sargent MOUNTAIN, WATER, SWAMP or

Betula occidentalis Nutt., not Hook. BLACK BIRCH

Betula utahensis Britt.

A frequent tree of low and mid-altitude valleys throughout the Basin. *Graham 7542* is a vegetative specimen; *Graham 9200*, *9426* and *9459* show old or mature pistillate catkins; the remaining sheets show staminate catkins in varying stages of development.

Dry Fork, in Juniper Zone, 7000 ft., June 26, 1931, *Graham 6385;* Douglass Canyon, W. of Dinosaur Quarry, 5000 ft., April 28, 1933,

Graham 7542, *Graham 7551;* N. of Dinosaur Quarry, 5500 ft., May 18, 1933, *Graham 7721;* Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7994*, *Graham 7995;* E. side of Green River, Island Park, 5300 ft., June 11, 1935, *Graham 9200;* along Red Creek, 7500 ft., June 26, 1935, *Graham 9426;* on N. slope of E. side canyon, 16 mi. by road up Indian Canyon from Duchesne, 6800 ft., June 28, 1935, *Graham 9459;* Bitter Creek, 3 mi. E. of Utah-Colorado state line, 7800 ft., Aug. 30, 1935, *Graham 10169.*

Betula glandulosa Michx. BOG or SCRUB BIRCH

An infrequent shrub along wet-meadow streams in the Lodgepole Pine and Spruce-Fir Zones of the Uinta Mts. *Doutt s. n.* is a vegetative specimen; *Graham 8181* shows staminate catkins; the remaining specimens show fruit.

Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8181;* edge of third Chain Lake, 11,000 ft., July 21, 1933, *Graham 8589;* between Paradise Park and Chepeta Lake (edge of Salix-filled meadow), 10,300 ft., Aug. 20, 1935, *Graham 10090;* N. of Robert's Pass, NE. slope of Mt. Emmons, 11,300 ft., July 20, 1933, *Doutt s. n.*

FAGACEAE

Quercus Gambellii Nutt.

All of the oaks listed belong to the Gambellii complex and perhaps should be considered forms of a single polymorphous species. This form occurs only in the extreme east end of the Basin in Colorado and on the southeastern rim of the Basin as at Post Canyon in the Tavaputs Plateau east of the Green River. *Graham 9702* is vegetative; the other specimens show flowers with *Graham 9861* possessing young acorns as well.

This and other species of oak are sometimes considered poisonous, as cattle which feed heavily and exclusively on oak, especially in the spring when the leaves are soft and palatable, develop so-called "oak poisoning." At other times of the year, however, in combination with other plants, oak furnishes an important constituent of cattle feed. The scarcity of oaks within the Basin's limits makes its danger negligible there, however.

White River flood-plain, W. end of Powell Park, 10 mi. W. of Meeker, Colo., 5800 ft., June 3, 1935, *Graham 9104;* head of Deep Channel Creek, Colo., 6400 ft., June 4, 1935, *Graham 9112;* along

road near Price Creek, Colo., 6700 ft., June 5, 1935, *Graham 9133;* W. Fork of Douglas Creek, Colo., 6600 ft., July 16, 1935, *Graham 9702;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9861.*

Quercus Gunnisonii (Torr.) Rydb.

The single specimen cited shows young acorns.

Upper middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9730.*

Quercus novomexicana (A. DC.) Rydb.

With the exception of *Graham 10165*, which was collected in the Colorado end of the Tavaputs Plateau, this form seems confined to the extreme west end of the Basin. It was also collected (*Graham 9212*) west of the Basin, near Snyderville. *Graham 9217* is vegetative; *9279* shows flowers and old acorns and *10165* shows acorns only.

Near Fruitland, along highway U. S. 40, about 2 mi. E. of Currant Creek, 6500 ft., June 13, 1935, *Graham 9217;* 2 mi. above mouth of Red Creek, 6200 ft., June 19, 1935, *Graham 9279;* one mi. W. of Baxter Pass, Colo., 8300 ft., Aug. 29, 1935, *Graham 10165.*

Quercus utahensis (A. DC.) Rydb. UTAH OAK

A form found in the west end of the Basin and on the southern Tavaputs Plateau but also collected on the outer slopes of the Basin as follows: To the west, Diamond Creek (*Graham 9231*); to the south, Pine Canyon (*Graham 8339*) and to the east, along road west of Grand Hogback, Colorado (*Graham 8339d*). Another specimen, approaching *Quercus venustula* Greene, was collected west of Grand Hogback, Colorado (*Graham 8339e*). Of the specimens cited, the June number is in flower; that of July shows flowers and young acorns; the August and September specimens both show mature acorns.

Red Creek valley, 7500 ft., June 26, 1935, *Graham 9409;* Horse Corn (Fortification) Canyon, 10 mi. from mouth on Hill Creek, 6800 ft., July 26, 1935, *Graham 9825;* Florence Canyon, 6000 ft., Aug. 1, 1935, *Graham 9955;* Duchesne River at mouth of West Fork, 7500 ft., Sept. 8, 1935, *Graham 10253.*

ULMACEAE

Celtis Douglasii Planch. HACKBERRY

An infrequent tree collected only near the Green River in the central part of the Basin near the Dinosaur Quarry and in the southernmost

part of the Basin along the lower Green River. *Graham 7751* shows flowers on leafless twigs; the other two specimens are vegetative, the earlier one in winter condition.

North of Dinosaur Quarry, 5500 ft., May 18, 1933, *Graham 7723;* Orchid (Mud) Springs Canyon, 5000 ft., May 20, 1933, *Graham 7751;* along Green River, Desolation Canyon, between Florence and Chandler Canyons, 4500 ft., Aug. 2, 1935, *Graham 9967.*

URTICACEAE

Urtica Lyallii S. Wats.

The single flowering specimen cited was collected along a stream near the rim of the Tavaputs Plateau.

Head of West Fork of Douglas Creek, Colo., 7600 ft., July 16, 1935, *Graham 9655.*

Urtica strigosissima Rydb.

An infrequent plant of stream banks in lower and mid-altitudes throughout the Basin. All of the specimens are in flower.

Dry Fork, in Juniper Zone, 7000 ft., June 26, 1931, *Graham 6383;* N. side of Strawberry River, 5 mi. below mouth of Red Creek, 6100 ft., June 19, 1935, *Graham 9273;* Willow Springs, 9550 ft., July 10, 1935, *Graham 9531;* Post Canyon, 7800 ft., July 29, 1935, *Graham 9931.*

SANTALACEAE

Comandra pallida A. DC. BASTARD TOADFLAX

A frequent plant throughout the Basin at low and mid-altitudes. It is often found in dry soil among Sagebrush but sometimes in association with other plants as well, and in a great variety of habitats. All of the specimens show flowers, except *Graham 9760* and *Peterson s. n.* (July 13) which are in fruit.

Hills E. of Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7693;* along Uinta River E. of Hayden, 5700 ft., June 2, 1933, *Graham 8043;* near Little Lake, 8300 ft., June 23, 1933, *Graham 8262;* in young Salix patch, along Ouray-Bonanza road 14 mi. E. of Ouray, 4800 ft., May 9, 1935, *Graham 8793;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9084;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9465;* Willow Springs, 9600 ft., July 10, 1935, *Graham 9546;* middle fork of Stuart Creek, Colo.,

7500 ft., July 18, 1935, *Graham 9760;* Red Bluff Wash, between White and Green Rivers, May 27, 1908, *Douglass s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.;* Uinta Basin, July 13, 1912, *Peterson s. n.*

POLYGONACEAE

Eriogonum alatum Torr.

Infrequent at mid-altitudes throughout the Basin. *Graham 6379* is in bud; *Graham 6368* is in flower; the other specimens show flowers and maturing achenes.

Davis Hollow, Taylor Mt., 8500 ft. (?), June 24, 1931, *Graham 6368, Graham 6379;* divide between Wells Draw and Minnie Maud tributary, 30 mi. from Myton, 7100 ft., July 5, 1935, *Graham 9499;* Cottonwood Canyon, 6900 ft., July 6, 1935, *Graham 9516;* Post Canyon, 8000 ft., July 27, 1935, *Graham 9843.*

Eriogonum arcuatum Greene

The single flowering specimen cited is from the southwestern part of the Basin.

Divide between Wells Draw and Minnie Maud tributary, 30 mi. from Myton, 7100 ft., July 5, 1935, *Graham 9504.*

Eriogonum aureum M. E. Jones

The single specimen cited is vegetative and therefore questionably determined. If correctly named our specimen would extend the range of this Utah endemic slightly northward.

East of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8934.*

Eriogonum Batemani M. E. Jones

Eriogonum bicolor M. E. Jones

Infrequent throughout the Basin at rather low altitudes. The species is here reported from Colorado for the first time and so represents a slight eastward extension of range; the cited specimens exhibit varying stages of anthesis.

Smith Wells Draw SW. of Myton, 7000 ft., June 28, 1933, *Graham 8329;* divide between Wells Draw and Minnie Maud tributary, 30 mi. from Myton, 7100 ft., July 5, 1935, *Graham 9503;* 10 mi. S. of Rangely, Colorado, 6400 ft., Aug. 31, 1935, *Graham 10178;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Eriogonum campanulatum Nutt.

Infrequent at low altitudes. All of the specimens cited are in flower.

Flat above Quarry "L," 4800 ft., Aug. 31, 1931, *Graham 7365;* sand of mixed desert N. of Bonanza, 5500 ft., Aug. 27, 1935, *Graham 10142;* flat above Quarry "L," 4800 ft., Sept. 11, 1935, *Graham 10266.*

Eriogonum cernuum Nutt.

Infrequent at lower mid-altitudes. The specimens cited are in flower.

Dry Fork, in Juniper Zone, 7000 ft., Sept. 5, 1931, *Graham 7441;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 9991;* Red Creek, 2 mi. N. of Fruitland, 6700 ft., Aug. 14, 1936, *Doutt 4317.*

Eriogonum corymbosum Benth.

The single specimen cited, collected among Sagebrush in the west end of the Basin, is in flower.

Red Creek, 2 mi. N. of Fruitland, 6700 ft., Aug. 14, 1936, *Doutt 4315.*

Eriogonum Gordonii Benth.

The single specimen cited, from the Mixed Desert Shrub Zone, is in early anthesis.

Desert 5 mi. E. of Lapoint, 5700 ft., June 22, 1935, *Graham 9307.*

Eriogonum heracleoides Nutt.

An infrequent species at mid-altitudes in the Uinta Mts. Both specimens cited were collected in Sagebrush of the Sub-montane Shrub Zone and are in flower.

SE. slope of Mosby Mt., 8000 ft., July 3, 1933, *Graham 8345;* E. of Red Creek, 7500 ft., June 26, 1935, *Graham 9401.*

Eriogonum Hookeri Wats.

The single specimen cited shows flowers and mature achenes.

Along Green River in Desolation Canyon between Florence and Chandler Canyons, 4500 ft., Aug. 2, 1935, *Graham 9970.*

Eriogonum inflatum Torr.

A frequent plant of low altitudes, preferring soils of high gypsum content in the Mixed Desert Shrub Zone. It is sometimes locally called "Popper."

Graham 7922, 8875, and *Peterson s. n.* (May 29) are immature plants;

the other specimens show varying stages of anthesis, with maturing achenes on the later numbers.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6098;* flat above Quarry "L," 4800 ft., Aug. 31, 1931, *Graham 7363;* bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7922;* desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8289;* bench W. of Green River, S. of Uteland Butte, 4800 ft., May 16, 1935, *Graham 8875;* desert 5 mi. E. of Lapoint, 5700 ft., June 22, 1935, *Graham 9309;* hills and ravines E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* Uinta Basin, July 15, 1912, *Peterson s. n.*

Eriogonum lonchophyllum T. and G.

The single specimen cited, collected in the east end of the Basin, is in flower.

Piceance Creek 5-10 miles below Rio Blanco, Colo., 7000 ft., July 17, 1935, *Graham 9713.*

Eriogonum medium Rydb.

The single flowering specimen of this Utah endemic cited is from the west end of the Basin. It approaches *Eriogonum micranthum* Nutt., with which it may be a hybrid.

Red Creek, 2 mi. N. of Fruitland, 6700 ft., Aug. 16, 1936, *Doutt 4324.*

Eriogonum microthecum Nutt.

A frequent species throughout the Basin at low altitudes. The specimens show varying stages of anthesis.

Flat above Quarry "L," 4800 ft., Aug. 31, 1931, *Graham 7368;* Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7391;* Dry Fork, in Juniper Zone, 7000 ft., Sept. 5, 1931, *Graham 7452;* Chandler Canyon, 5800 ft., Aug. 3, 1935, *Graham 9981;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 10000.*

Eriogonum neglectum Greene

Collected only in the eastern and southernmost parts of the Basin at low and mid-altitudes. *Graham 9051* is in bud; the other specimens are in flower.

S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6000 ft., May 31, 1935, *Graham 9051;* upper middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9741*; near head of Post Canyon, 8500 ft., July 31, 1935, *Graham 9941.*

Eriogonum ovalifolium Nutt. SILVER PLANT

The specimens cited are in flower. This and similar species of Eriogonum are locally called "Butter Balls" or "Snow Balls."

Vicinity of Desert Springs, 5000 ft., May 30, 1933, *Graham 7952;* Uinta River Canyon, 7000 ft., June 2, 1933, *Graham 8047;* bench W. of Bitter Creek, along Watson-Ouray road, 6000 ft., May 27, 1935, *Graham 9005.*

Eriogonum ovalifolium Nutt. var. **purpureum** (Nutt.) A. Nels.

Common and widely distributed throughout the Basin at low altitudes. *Graham 7583* and *7675* are in bud; of the other numbers, most of the May specimens are in flower and most of the June specimens are in fruit.

Sand hills out Maeser road, 6000 ft., May 2, 1933, *Graham 7583;* 5 mi. NW. of Dinosaur Quarry, 5500 ft., May 16, 1933, *Graham 7675;* Asphalt ridge, 4 mi, SW. of Vernal, 6000 ft., May 25, 1933, *Graham 7837;* Vernal-Manila road N. of Vernal, 6500 ft., June 19, 1933, *Graham 8170;* desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8290;* E. of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8928;* W. of Willow Creek, Thorne's ranch, 5400 ft., May 23, 1935, *Graham 8956;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9082;* head of Deep Channel Creek, Colo., 6400 ft., June 4, 1935, *Graham 9125;* S. of Red Bluff Wash, May 24, 1908, *Douglass s. n.;* N. of White River, 5 mi. above Dragon-Vernal stage road, June 25, 1908, *Douglass s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.;* Ainge Gulch, W. of Dinosaur Quarry, June 17, 1912, *Douglass s. n.*

The following flowering specimens are considered to be intermediate between *Eriogonum ovalifolium* and its variety *purpureum:*

Bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7903;* vicinity of Desert Springs, 5000 ft., May 30, 1933, *Graham 7954;* bench, head of Sand Wash, 5300 ft., May 30, 1933, *Graham 7962;* Uinta River Canyon, 7000 ft., June 2, 1933, *Graham 8062;* E. of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8926;* Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9151.*

Eriogonum Porteri Small

Frequent at upper altitudes in the Uinta Mts. The species is endemic to Utah. The specimens show varying stages of anthesis.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6625a;* on ridge NNW. of Paradise Park, 10,500 ft., July 8, 1933, *Graham 8445;* E. slope of Mt. Emmons, 11,000 ft., July 18, 1933, *Graham 8465;* E. slope of Mt. Emmons, 11,000 ft., July 20, 1933, *Graham 8533;* SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9323.*

Eriogonum racemosum Nutt.

Elkhorn Ranger Station, 6500 ft., Aug. 27, 1914, *DeMoisy Jr. 142,* USFS 18813.

Eriogonum salsuginosum (Nutt.) Hook.

Frequent at low altitudes in the central part of the Basin. The specimens show varying stages of anthesis, with maturing achenes on the June numbers.

Between Green River and Quarry "L," 4700 ft., June 20, 1931, *Graham 6127;* between Green River and Quarry "L," 4700 ft., June 21, 1931, *Graham 6177;* bad lands near Skull Pass Quarry, 5000 ft., May 6, 1933, *Graham 7605;* Douglass Canyon, W. of Dinosaur Quarry, 5000 ft., May 19, 1933, *Graham 7729;* Skull Pass Quarry, 5000 ft., May 18, 1933, *Graham 7827;* between White and Green Rivers, Devil's Playground, June 23, 1908, *Douglass s. n.*

Eriogonum Shockleyi Wats.

Infrequent at low altitudes; both specimens cited are in flower.

Flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6153;* Juniper Zone below Moon Lake, 7500 ft., June 30, 1931, *Graham 6411.*

Eriogonum umbellatum Torr.

Common throughout the Basin, especially in Sagebrush areas of the Sub-montane Shrub Zone. *Graham 8251* and *8251a* are in bud; the other specimens show varying stages of anthesis.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6359;* W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6479;* Vernal-Manila road N. of Vernal, 6500 ft., June 19, 1933, *Graham 8164;* near Little Lake, 8300 ft., June 23, 1933, *Graham 8251, Graham 8251a;* SE. slope of Mosby Mt., 8000 ft., July 3, 1933, *Graham 8354;* Mountain Home-Tabiona road 2 mi. W. of Rock Creek, 7600 ft., June 25, 1935, *Graham 9366;* Willow Springs, 9600 ft., July 10, 1935, *Graham 9558;* ridge W. of head of Post Canyon, 8000 ft., July 27, 1935, *Graham 9852;* N. of White River, 5 mi. above Dragon-Vernal stage road, June 25, 1908, *Douglass s. n.;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Oxyria digyna (L.) Hill MOUNTAIN SORREL

This Eurasian arctic-alpine species is frequent in rocky situations of the Alpine Zone in the Uinta Mts. *Graham 8450* is in flower; the other numbers show developing achenes.

Slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6630;* ridge NNW. of Paradise Park, 11,300 ft., July 8, 1933, *Graham 8425;* N. slope of Marsh Peak, 11,500 ft., July 10, 1933, *Graham 8450;* SE. slope of Mt. Emmons, 11,600 ft., July 18, 1933, *Graham 8468;* head of West Fork of Whiterocks River, 11,600 ft., Aug. 21, 1935, *Graham 10123.*

Polygonum aviculare L.

Infrequent throughout the Basin. Both specimens of this European introduction cited show flowers and maturing achenes.

Along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7413;* along old road, Post Canyon, 8000 ft., July 29, 1935, *Graham 9929.*

Polygonum bistortoides Pursh

Bistorta bistortoides (Pursh) Small

Frequent in upper and mid-altitude woodlands, especially in wet meadows along streams. The specimens show varying degrees of anthesis, with maturing achenes on the late July number.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6590;* near Little Lake, 8500 ft., June 22, 1933, *Graham 8230;* near Little Lake, 8300 ft., June 23, 1933, *Graham 8238;* SE. slope of Mt. Emmons, near third Chain Lake, 11,000 ft., July 21, 1933, *Graham 8587.*

Polygonum bistortoides Pursh var. **linearifolium** Small

Bistorta linearifolia Greene

The following specimen of this species is in the herbarium of F. J. Hermann at Ann Arbor, Michigan: rocky alpine meadow, above Chain Lakes, 11,300 ft., July 18, 1933, *Hermann 4958* (also in Mo. Bot. Gard., Gray Herb., Univ. Wyo., U. S. Nat. Herb., and Phil. Acad.).

Polygonum buxiforme Small

The single specimen cited, in late anthesis, was collected in the Uinta Mts.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6455.*

Polygonum Convolvulus L. FALSE BUCKWHEAT, BINDWEED

Bilderdykia Convolvulus (L.) Dum.

The single specimen of this European introduction cited is in fruit. In garden, Lapoint, 5500 ft., Aug. 5, 1935, *Graham 9987*.

Polygonum Douglasii Greene

Infrequent throughout the Basin at low and mid-altitudes. The specimens show varying stages of maturing achenes, except *Graham 9798*, which is in early anthesis.

Marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9798;* ridge W. of head of Post Canyon, 8000 ft., July 27, 1935, *Graham 9834;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9900b;* near head of Hill Creek, 8500 ft., July 31, 1935, *Graham 9935*.

Polygonum natans (Michx.) A. Eaton

Polygonum amphibium Small, and Am. authors, not L.

Polygonum natans A. Eaton forma *genuinum* Stanford See Rhodora **27**: 158. 1925.

Observed only in the locality cited where its leaves were floating on the surface of the water of a very slowly-flowing stream. Both specimens show flowers, with maturing achenes also on the July number.

Marsh, mouth of Ashley Creek, 4750 ft., May 30, 1935, *Graham 9025;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9792*.

Polygonum natans (Michx.) A. Eaton forma **Hartwrightii** (Gray) Stanford

Persicaria Hartwrightii (Gray) Greene

Polygonum Hartwrightii Gray

The single specimen cited is a vegetative one.

Between Green River and Quarry "L," 4700 ft., June 20, 1931, *Graham 6136*.

Polygonum Persicaria L. LADY'S THUMB

Persicaria Persicaria (L.) Small

Both specimens of this European species cited show maturing achenes. They were collected in the vicinity of cultivation.

Along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7415;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9800.*

Polygonum viviparum L.

Bistorta vivipara (L.) S. F. Gray

Frequent in upper altitudes of the Uinta Mts., especially in wet meadows along streams. All of the specimens of this arctic-alpine Eurasian species cited show flowers and maturing achenes.

Along creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6543;* between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 19, 1933, *Graham 8492;* meadow below dam, Paradise Park, 10,000 ft., Aug. 16, 1935, *Graham 10053;* head of West Fork of Whiterocks River, 12,000 ft., Aug. 21, 1935, *Graham 10127.*

Rumex Acetosella L. SHEEP SORREL

Yellowstone Ranger Station pasture, Duchesne County, 7500 ft., June 24, 1926, *Starr 44,* USFS 61084 and June 30, 1928, *Starr 36,* USFS 61083.

Rumex crispus L. CURLED DOCK

Specimens of this European species were collected along roads and near cultivation. *Graham 7426* is in fruit; the other specimens are in flower.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6248, Graham 6265;* along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7426;* head of West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9654.*

Rumex hymenosepalus Torr. CANAIGRE

Common at low altitudes throughout the Basin. It may occur in rocky or sandy situations but is most frequent in heavy, clay soils, often in bad lands areas where little else will grow. Its leaves are edible and make a good cooked "green." Its tuberous roots have long been used by Indians as a source of tannin.

If *Rumex salinus* A. Nels. is considered a distinct and valid species, *Graham 6126, 8871,* and *Peterson s. n.* might be referred to that entity. *Graham 6126, 7525b, 9105,* and *Peterson s. n.* show mature achenes; the other numbers exhibit flowers with a few young achenes on some of the later numbers.

Between Green River and Quarry "L," 4700 ft., June 20, 1931, *Graham 6126;* 5 mi. NW. of Dinosaur Quarry, 5500 ft., April 25, 1933, *Graham 7525a*, *Graham 7525b;* hills E. of Dinosaur Quarry, 5000 ft., April 29, 1933, *Graham 7569;* Skull Pass Quarry, 5000 ft., May 6, 1933, *Graham 7622b;* W. side of Green River, near Quarry "L," 4700 ft., May 4, 1935, *Graham 8758;* along Ouray-Bonanza road 14 mi. E. of Ouray, 4800 ft., May 9, 1935, *Graham 8794;* W. side of Duchesne River, 4 mi. above Ouray, 4800 ft., May 15, 1935, *Graham 8871;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9094;* S. side of White River, 4 mi. below mouth of Piceance Creek, Colo., 5700 ft., June 3, 1935, *Graham 9105;* head of Deep Channel Creek, Colo., 6400 ft., June 4, 1935, *Graham 9121;* Red Bluff Wash, between White and Green Rivers, May 27, 1908, *Douglass s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Rumex mexicanus Meisn.

Frequent throughout the Basin at low and mid-altitudes. The June and early July specimens show flowers for the most part, the later specimens exhibit mature achenes. *Graham 9786*, which is in fruit, has denticulate valves, and thus simulates *Rumex salicifolius* var. *denticulatus* Torr.

West side of Green River, near Quarry "L," 4700 ft., June 22, 1931, *Graham 6199;* up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6540;* S. end of Strawberry reservoir, 7500 ft., June 19, 1935, *Graham 9290;* along road, Red Creek valley, 7500 ft., June 26, 1935, *Graham 9421;* along road, head of West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9677;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9786;* in Aspen woods below Dyer Mine, 9000 ft., Sept. 4, 1935, *Graham 10189;* White River bottom near Utah-Colorado state line, July 6, 1908, *Douglass s. n.*

Rumex Patientia L. PATIENCE

The single specimen of this European species cited, from the Tavaputs Plateau, shows mature achenes.

Post Canyon, 7800 ft., July 28, 1935, *Graham 9874.*

Rumex paucifolius Nutt.

The single specimen cited, from the Uinta Mts., is in flower.

Meadow, edge of Lodgepole Pine forest, E. of Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8192.*

CHENOPODIACEAE

Atriplex argentea Nutt. SALT BUSH

The single fruiting specimen cited was collected in a locality where it formed the ground cover among Greasewood with, but commoner than, *Atriplex Powellii.*

Island Park road E. of Brush Creek, 5000 ft., June 12, 1935, *Graham 9208.*

Atriplex canescens (Pursh) Nutt.

A frequent shrub of the Mixed Desert Shrub Zone and lower river canyons throughout the Basin. *Doutt 900* is a vegetative specimen; the August and September numbers show fruit; the remaining specimens exhibit staminate flowers except *Graham 9505* and *Peterson s. n.* (July 13) which show immature fruit.

Flat between Ouray and Quarry "L," 4700 ft., June 21, 1931, *Graham 6175;* flat above Quarry "L," 4800 ft., Aug. 31, 1931, *Graham 7362;* SW. of Myton, 5500 ft., June 28, 1933, *Graham 8330;* Wells Draw, 20 mi. SW. of Myton, 6300 ft., July 5, 1935, *Graham 9505, Graham 9506, Graham 9507;* Chandler Canyon, 6000 ft., Aug. 2, 1935, *Graham 9974;* Leota bench, flat above Quarry "L," 4800 ft., Sept. 11, 1935, *Graham 10259;* flat above Quarry "L," 4800 ft., Sept. 11, 1935, *Graham 10265;* Dry Run, Red Bluff Wash, along Vernal-Dragon road between White and Green Rivers, June 27, 1908, *Douglass s. n.;* Ainge Gulch, W. of Dinosaur Quarry, June 17, 1912, *Peterson s. n.;* Uinta Basin, July 13, 1912, *Peterson s. n.;* Pariette Bench, 12 mi. SW. of Ouray, 5000 ft., June 22, 1933, *Doutt 875;* among Junipers, Kennedy's Draw, 20 mi. E. of Ouray, 4700 ft. (?), July 1, 1933, *Doutt 900.*

Atriplex confertifolia (Torr. and Frem.) Wats. SHADSCALE

A common shrub throughout the Basin in the Mixed Desert Shrub Zone where, in many places, it is the dominant plant, or is mixed as co-dominant, with *Tetradymia spinosa* and *Artemisia spinescens* to form the Atriplex-Tetradymia Association. *Graham 6117, 7330, 7366, 9525, Peterson s. n.* (July 13) and *Doutt 890* show varying stages of maturing fruit; the others show staminate flowers except *Graham 6677* which is an unusual bisexual plant.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6117;* Titanothere Quarry W. of Vernal, 5500 ft., July 6, 1931, *Graham 6677;* between Green River and Quarry "L," 4700 ft., Aug.

30, 1931, *Graham 7330;* flat above Quarry "L," 4800 ft., Aug. 31, 1931, *Graham 7366;* between Dinosaur Quarry and Green River, 4800 ft., May 19, 1933, *Graham 7746;* talus slope, S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7880;* desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8303;* Leland Bench, 5000 ft., May 13, 1935, *Graham 8835;* Leland Bench, 5000 ft., May 15, 1935, *Graham 8862;* E. of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8951;* 5 mi. W. of Bitter Creek along Watson-Ouray road, 6500 ft., May 26, 1935, *Graham 8995;* Cottonwood Canyon, 5700 ft., July 7, 1935, *Graham 9525*, *Graham 9526;* Dry Run, Red Bluff Wash, Vernal-Dragon road between White and Green Rivers, June 27, 1908, *Douglass s. n.;* E. of Dinosaur Quarry, May 30, 1912, *Peterson s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.;* Uinta Basin, July 13, 1912, *Peterson s. n.;* Willow Creek, 2 mi. above Thorne's ranch, 5300 ft., June 29, 1933, *Doutt 890.*

Atriplex corrugata Wats.

A frequent plant throughout the Basin in the Mixed Desert Shrub Zone, especially in clay situations where the soil alkali is close to or upon the surface. Here it is associated as a co-dominant or secondary species to form the Mat Atriplex Association with *Atriplex oblanceolata*, usually to the complete exclusion of all other perennial plants. *Graham 7326* is a vegetative specimen; *Graham 6189*, *7854*, *8857*, *9203*, *9765*, and *Doutt 899* all show varying stages of maturing fruit; the remaining numbers represent staminate plants.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6104;* flat between Ouray and Quarry "L," 4700 ft., June 21, 1931, *Graham 6189;* between Green River and Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7326;* 5 mi. NW. of Dinosaur Quarry, 5500 ft., April 24, 1933, *Graham 7520;* 9 mi. SSE. of Vernal, 5000 ft., April 27, 1933, *Graham 7532;* Pariette Mine, 10 mi. SE. of Myton, 5000 ft., May 26, 1933, *Graham 7853*, *Graham 7854;* 9 mi. SSE. of Vernal, 5000 ft., May 2, 1935, *Graham 8748;* S. edge of Leland Bench, 5000 ft., May 14, 1935, *Graham 8857;* near DeJournette's ranch, Brush Creek, 5 mi. NW. of Dinosaur Quarry, 5000 ft., June 12, 1935, *Graham 9203;* Raven Park, N. of Rangely, 5500 ft., July 19, 1935, *Graham 9765;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* flat upland desert 4 mi. S. of Jensen, April 22, 1932, *Sweadner s. n.;* Kennedy's Draw, 20 mi. E. of Ouray, 4700 ft. (?), July 1, 1933, *Doutt 899.*

Atriplex Nuttallii Wats.

An infrequent species collected only on flood-plains of the larger streams near the center of the Basin. *Graham 6111* shows immature, the two Doutt numbers mature, fruit; the other numbers represent staminate plants which are questionably determined.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6110, Graham 6111;* covering flood-plain under Cottonwoods, White River, 5 mi. E. of Ouray, 4800 ft., May 9, 1935, *Graham 8791;* Red Creek, 2 mi. N. of Fruitland, 6700 ft., Aug. 16, 1936, *Doutt 4329, Doutt 4332.*

Atriplex oblanceolata Rydb. BURRO, JACKASS, or CASTLE VALLEY CLOVER

A common plant throughout the Mixed Desert Shrub Zone of the Basin, usually associated with *Atriplex corrugata* to form the Mat Atriplex Association in clay areas where soil alkali is near or upon the surface. Regarding the name of this species Dr. Standley writes that he is now "inclined to believe that Rydberg's species should be referred to synonymy under *A. cuneata* A. Nels., an older name." *Graham 7324* and *Peterson s. n.* (vegetative) are vegetative specimens; *Graham 6121, 6161, 7328, 7340, 7612, 7670, 7734, 8837, 8854, 8856, 8860, 8888, 8891, 8931, 9766, Douglass s. n.* (pistillate), *Peterson s. n.* (pistillate) and *Doutt 898* show varying stages of pistillate anthesis and maturing fruit; the remaining numbers represent staminate plants, except *Graham 6129* and *6673* which are unusual monoecious individuals.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6121;* between Green River and Quarry "L," 4700 ft., June 20, 1931, *Graham 6129;* flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6161;* Dinosaur Quarry, 5000 ft., July 6, 1931, *Graham 6673;* between Green River and Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7324, Graham 7328, Graham 7340;* Skull Pass Quarry, 5000 ft., May 5, 1933, *Graham 7608, Graham 7612, Graham 7613;* 5 mi. NW. of Dinosaur Quarry, 5500 ft., May 16, 1933, *Graham 7669, Graham 7670;* hills E. of Dinosaur Quarry, 5500 ft., May 16, 1933, *Graham 7701;* Douglass Canyon, W. of Dinosaur Quarry, 5000 ft., May 19, 1933, *Graham 7733, Graham 7734;* Orchid (Mud) Springs Canyon, 5000 ft., May 20, 1933, *Graham 7764;* Pariette Mine, 10 mi. SE. of Myton, 5000 ft., May 26, 1933, *Graham 7855;* along Ouray-Bonanza road 14

mi. E. of Ouray, 4800 ft., May 9, 1935, *Graham 8800;* S. slope of Leland Bench, 5000 ft., May 13, 1935, *Graham 8836, Graham 8837;* S. slope of Leland Bench 5000 ft., May 14, 1935, *Graham 8852, Graham 8853, Graham 8854, Graham 8855, Graham 8856, Graham 8858, Graham 8859, Graham 8860;* bench W. of Green River, just S. of Uteland Butte, 4800 ft., May 16, 1935, *Graham 8888, Graham 8889, Graham 8891, Graham 8892;* E. of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8930, Graham 8931;* Raven Park, N. of Rangley, Colo., 5500 ft., July 19, 1935, *Graham 9766;* Dry Run, Red Bluff Wash, Vernal-Dragon road between White and Green Rivers, June 27, 1908, *Douglass s. n.* (pistillate), *Douglass s. n.* (staminate); E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.* (vegetative), *Peterson s. n.* (pistillate); Kennedy's Draw, 20 mi. E. of Ouray, 4700 ft. (?), July 1, 1933, *Doutt 898.*

Atriplex Powellii Wats.

An infrequent species of the Mixed Desert Shrub Zone which sometimes takes complete possession of bare areas among Shadscale (*Graham 8280*) or Greasewood (*Graham 9209*). *Graham 8280* and *9209* show both staminate and immature pistillate plants on the same sheet; the other specimens are in fruit.

Between Green River and Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7329;* hills just W. of Jensen, 5000 ft., June 27, 1933, *Graham 8280;* Island Park road E. of Brush Creek, 5000 ft., June 12, 1935, *Graham 9209;* flat above Quarry "L," 4800 ft., Sept. 11, 1935, *Graham 10269.*

Atriplex rosea L.

The single specimen of this Old World species cited represents a monoecious plant.

W. side of Green River near Quarry "L," 4700 ft., Aug. 29, 1931, *Graham 7308.*

Atriplex tridentata Kuntze

Collected only on the Green River flood-plain in the locality cited. *Graham 7333* is in fruit; the other specimens are staminate.

Between Green River and Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7333, Graham 7334, Graham 7335.*

Atriplex truncata (Torr.) Gray

The single specimen cited is in fruit.

W. side of Green River near Quarry "L," 4700 ft., Aug. 29, 1931, *Graham 7317.*

Atriplex Wolfii Wats.

Infrequent throughout the Basin at low altitude. Both specimens cited represent monoecious plants with maturing fruit.

Greasewood flat of Evacuation Creek, 3 mi. S. of Dragon, 6000 ft., Aug. 28, 1935, *Graham 10147;* Red Creek, 2 mi. N. of Fruitland, 6700 ft., Aug. 16, 1936, *Doutt 4328.*

Bassia hyssopifolia (Pall.) Kuntze

Echinopsilon hyssopifolius Moq.

Collected only at the locality cited, where the natives claim it to be a newcomer to the Basin within the last few years. This weed is apparently becoming established in the west and is here reported from Utah for the first time. The specimen is in early anthesis.

Thorne's ranch, Willow Creek, 5 mi. N. of mouth of Agency Draw, 5100 ft., Aug. 5, 1935, *Graham 9983.*

Blitum capitatum L. STRAWBERRY BLITE

Chenopodium capitatum (L.) Aschers.

Infrequent throughout the Basin in mid-altitude zones. Both specimens of this Eurasian species cited are in fruit.

Along road, Red Creek Valley, 7500 ft., June 26, 1935, *Graham 9417;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9892.*

Chenopodium album L. f. **glomerulosum** (Reichenb.) Aellen

Chenopodium glomerulosum Reichenb.

The single specimen cited is in flower.

Marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9789.*

Chenopodium Berlandieri Moq.

A frequent plant throughout the Basin at low altitudes. *Peterson s. n.* is a vegetative specimen; *Douglass s. n.* is in bud; *Graham 6185* is in early anthesis and probably represents a variety of the species.

Flat between Ouray and Quarry "L," 4700 ft., June 21, 1931, *Graham 6185;* Dry Run, Red Bluff Wash, Dragon-Vernal road between White and Green Rivers, June 27, 1908, *Douglass s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Chenopodium Fremontii S. Wats.

Infrequent throughout the Basin in a variety of habitats of low and mid-altitude zones. The May specimen is in flower and dwarfed; the other two are normal in size and bear fruit.

W. side of Green River near Quarry "L," 4700 ft., Aug. 29, 1931, *Graham 7311;* between U ranch and sheep bridge, Uinta River Canyon, 8200 ft., July 23, 1933, *Graham 8622a;* rocky slope, Uteland Mine, 4800 ft., May 17, 1935, *Graham 8902.*

Chenopodium leptophyllum Nutt.

An infrequent species of dry situations of low and mid-altitudes The specimens show flowers and fruit.

Flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6147;* Dry Fork, in Juniper Zone, 7000 ft., Sept. 5, 1931, *Graham 7447;* Red Creek, 2 mi. N. of Fruitland, 6700 ft., Aug. 14, 1936, *Doutt 4318.*

Chenopodium salinum Standl.

Chenopodium glaucum Am. authors, mainly
Chenopodium glaucum L. var. *salinum* (Standl.) Aellen

An infrequent species in moist situations of low altitudes throughout the Basin. Both specimens cited show maturing fruit.

Along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7418;* White River bottom, near Utah-Colorado state line, July 6, 1908, *Douglass s. n.*

Dondia Torreyana (S. Wats.) Standl. SEA BLITE, ALKALI WEED

Suaeda Moquini (Torr.) A. Nels., in part
Suaeda Torreyana S. Wats.

A frequent plant of alkali flats throughout the Basin, often at the edge of dried ponds or on flood-plains in the Mixed Desert Shrub Zone. *Graham 8907* and *8945* are vegetative specimens; all the others, except *10145*, which shows fruit, are in flower.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6112;* between Green River and Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7330a;* alkali edge of lake, near mouth of Pariette Creek, 4700 ft., May 18, 1935, *Graham 8907;* E. of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8945;* Greasewood flat, Evacuation Creek, 3 mi. S. of Dragon, 6000 ft., Aug. 28, 1935, *Graham 10145;* Willow Creek, above Thorne's ranch, 5300 ft., June

29, 1933, *Doutt 893;* Dry Run, Red Bluff Wash, Dragon-Vernal road between White and Green Rivers, June 27, 1908, *Douglass s. n.;* Uinta Basin, July 13, 1912, *Peterson s. n.*

Eurotia lanata (Pursh) Moq. WHITE or WINTER SAGE, WINTER FAT

A frequent plant throughout the low altitude zones of the Basin. It usually occurs in upper Mixed Desert Shrub Zone or lowermost Juniper-Pinyon areas where, in rather heavy soils, it becomes the dominant plant forming the Eurotia Association. *Graham 8928, 8978* and *Doutt 897* are vegetative specimens, the first having a broad, woody, fasciated stem. The others, except *Graham 7446, 10141* and *Doutt 4326*, which are in fruit, show various stages of anthesis.

Dry Fork, in Juniper Zone, 7000 ft., Sept. 5, 1931, *Graham 7446;* desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8281, Graham 8282;* 15 mi. SW. of Myton, 5500 ft., June 28, 1933, *Graham 8331;* E. of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8929;* Watson-Ouray road, between Bitter and Willow Creeks, 6000 ft., May 25, 1935, *Graham 8978;* E. side of Green River, Island Park, 5000 ft., June 11, 1935, *Graham 9185;* Tabiona-Fruitland road, 5 mi. E. of Fruitland, 6800 ft., June 25, 1935, *Graham 9361;* upper middle fork of Stuart Creek, Colo., near camp, 7000 ft., July 19, 1935, *Graham 9771;* sand of Mixed Desert N. of Bonanza, 5500 ft., Aug. 27, 1935, *Graham 10141;* Kennedy's Draw, 20 mi. E. of Ouray, 4700 ft.(?), July 1, 1933, *Doutt 897;* Red Creek, 2 mi. N. of Fruitland, 6700 ft., Aug. 16, 1936, *Doutt 4326.*

Grayia spinosa (Hook.) Moq. HOP SAGE

Grayia polygaloides H. and A.

A frequent plant throughout the Basin in light, sandy areas of the Mixed Desert Shrub Zone. It is always associated with other shrubby species and nowhere in the Basin does it form a closed association. It seldom occurs in sufficient numbers to be considered even an important secondary species, as it does in other parts of Utah and Nevada (see Shantz, in Tidestrom 1925 p. 18). *Graham 6128, 8997* and *Douglass s. n.* are vegetative specimens; *Graham 7689, 7715, 8761, 8762* and *8882* represent staminate plants; the remaining numbers show varying stages of developing and mature fruit.

Between Green River and Quarry "L," 4700 ft., June 20, 1931, *Graham 6128;* flat above Quarry "L," 4800 ft., June 20, 1931, *Graham*

6169; Taylor Mt., alt. ?, June 24, 1931, *Graham 6334;* 3 mi. W. of Dinosaur Quarry, 5500 ft., May 15, 1933, *Graham 7660;* hills E. of Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7689;* N. of Dinosaur Quarry, 5500 ft., May 18, 1933, *Graham 7715;* between Dinosaur Quarry and Green River, 4800 ft., May 19, 1933, *Graham 7745;* desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8284;* flat above Quarry "L," 5000 ft., May 5, 1935, *Graham 8760, Graham 8761, Graham 8762;* bench W. of Green River, S. of Uteland Butte, 4800 ft., May 16, 1935, *Graham 8882, Graham 8893;* 5 mi. W. of Bitter Creek along Watson-Ouray road, 6300 ft., May 26, 1935, *Graham 8997;* Island Park road, E. of Brush Creek, 5000 ft., June 12, 1935, *Graham 9205;* Dry Run, Red Bluff Wash, Dragon-Vernal road between White and Green Rivers, June 27, 1908, *Douglass s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Kochia vestita (S. Wats.) Rydb. GRAY MOLLY

A frequent plant throughout the Basin in somewhat stony situations, usually on flat, gravelly benches, where, with the grass, *Hilaria Jamesii,* it forms the Kochia-Hilaria Association. *Graham 8946* is a vegetative specimen; *Graham 8297* and *Douglass s. n.* show pistillate flowers; *Graham 9204* and *Peterson s. n.* show staminate flowers; the remaining specimens are in very early anthesis.

Desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8297;* along Ouray-Bonanza road, 14 mi. E. of Ouray, 4800 ft., May 9, 1935, *Graham 8801;* S. slope of Leland Bench, 5000 ft., May 14, 1935, *Graham 8851, Graham 8861;* E. of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8946;* Island Park road E. of Brush Creek, 5000 ft., June 12, 1935, *Graham 9204;* bluffs between White and Green Rivers, July 1, 1908, *Douglass s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Monolepis Nuttalliana (Schult.) Greene POVERTY WEED

This world-wide species occurs infrequently at low and mid-altitudes throughout the Basin. All of the specimens cited show fruit in various stages of development.

Up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6537;* talus slope, S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7876;* E. of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8949;* along road, Red Creek Valley, 7500 ft., June 26, 1935, *Graham 9418;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Monolepis pusilla Torr.

An infrequent species of the Mixed Desert Shrub Zone. Both of the specimens cited were collected under Greasewood; the earlier one is in flower; the later one is in fruit.

Between Dinosaur Quarry and Green River, 4800 ft., May 19, 1933, *Graham 7742;* flat above marsh, mouth of Ashley Creek, 4800 ft., May 30, 1935, *Graham 9020.*

Salsola Pestifer A. Nels. SALTWORT, RUSSIAN THISTLE

Salsola Tragus Reichenb., not L.

A frequent species of sandy areas throughout the Basin in the Mixed Desert Shrub Zone, it is reported to have entered the Basin about 1915. *Graham 6131* and *6222* are young plants with juvenile foliage, the latter being in early anthesis; the other numbers show old plants with various stages of maturing fruit.

While the Russian Thistle has been considered a pest, it has been used in the Uinta Basin to make good feed for horses, after it has been salted and seasoned. In early spring the young plants form good feed for cattle and horses, as the old plants do after they have been softened by snow. It acts also as a soil binder and erosion-control species, not only by invading bare areas, but by checking the flow of streams into which the old plants have been blown by the wind.

Between Green River and Quarry "L," 4700 ft., June 20, 1931, *Graham 6131;* W. side of Green River, near Quarry "L," 4700 ft., June 22, 1931, *Graham 6222;* W. side of Green River, near Quarry "L," 4700 ft., Aug. 29, 1931, *Graham 7321;* along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7425;* flat above Quarry "L," 4800 ft., Sept. 11, 1935, *Graham 10264.*

Sarcobatus vermiculatus (Hook.) Torr. GREASEWOOD, CHICO

Batis vermiculatus Hook.

The dominant plant at low altitudes throughout the Basin on the flood-plains of secondary streams and on alkali flats throughout the Mixed Desert Shrub Zone. All of the specimens are in some stage of anthesis, except the three August specimens, which are in fruit.

While sheep may eat Greasewood on the winter range with no ill effects, the plant may cause death under certain conditions, when it is eaten heavily and exclusively. A case was brought to our attention where an autopsy on a sheep disclosed large balls of matted, thorny Greasewood twigs in the animal's stomach. It may be possible

that, in addition to the sodium and potassium oxalates in the plant sometimes held responsible for its toxic effect, there may be mechanical injury involved, as indicated in this case.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6125;* between Green River and Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7339;* 30 mi. SW. of Myton, 5500 ft., June 28, 1933, *Graham 8318;* Cottonwood Canyon, 5700 ft., July 7, 1935, *Graham 9523;* Evacuation Creek, 3 mi. S. of Dragon, 6000 ft., Aug. 28, 1935, *Graham 10144;* Dry Run, Red Bluff Wash, Dragon-Vernal road between White and Green Rivers, June 27, 1908, *Douglass s. n.;* Uinta Basin, July 13, 1912, *Peterson s. n.;* Red Creek, 2 mi. N. of Fruitland, 6700 ft., Aug. 14, 1936, *Doutt 4322.*

AMARANTHACEAE

Amaranthus blitoides S. Wats.

An infrequent species of low and mid-altitudes throughout the Basin. A specimen (*Graham 9629*) was also collected on the south slopes of the Book Cliffs, in Water Canyon. The specimens all show maturing fruit.

Species of Amaranthus, if eaten in large quantities, will cause bloating and sometimes death, particularly to cattle.

Dry Fork, in Juniper Zone, 7000 ft., Sept. 5, 1931, *Graham 7445;* upper Stanaker Draw, lower Juniper Zone, 8700 ft., Sept. 7, 1931, *Graham 7465;* in sand of mixed desert N. of Bonanza, 5500 ft., Aug. 27, 1935, *Graham 10140.*

Amaranthus graecizans L. TUMBLEWEED

Amaranthus albus L.

This Old World species was collected only in the locality cited. The specimen is in fruit.

Dry Fork, in Juniper Zone, 7000 ft., Sept. 5, 1931, *Graham 7442.*

Amaranthus Powellii S. Wats.

Collected only in the locality cited; the specimen is in fruit.

Along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7433.*

NYCTAGINACEAE

Abronia elliptica A. Nels.

A frequent plant of sandy places in the Mixed Desert Shrub Zone throughout the Basin. All of the specimens cited show various stages of anthesis, with maturing fruit on most of the June numbers.

Graham 7625, *7694* and *7847* do not have the appearance of typical *A. elliptica*. They fit Standley's *A. ramosa* (see Contr. Nat. Herb. **12**: 321. 1909) which he later (N. Am. Flora **21**: 251. 1931) considered synonymous with *A. elliptica*. Whether the two are truly different remains to be determined.

Flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6142*, *Graham 6162;* flat between Ouray and Quarry "L," 4700 ft., June 21, 1931, *Graham 6184;* 9 mi. SSE. of Vernal, 5000 ft., April 27, 1933, *Graham 7538;* flat S. of Skull Pass Quarry, 5000 ft., May 9, 1933, *Graham 7625;* hills E. of Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7694;* Pariette Mine, 10 mi. SE. of Myton, 5000 ft., May 26, 1933, *Graham 7847;* bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7934;* desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8279;* E. of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8922;* Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9161;* Ainge Gulch, W. of Dinosaur Quarry, June 17, 1912, *Douglass s. n.;* Ainge Gulch, 5 mi. N. of Jensen, May 29, 1912, *Peterson, s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Tripterocalyx micranthus (Torr.) Hook.

Abronia micrantha Torr.

A frequent plant throughout sandy areas of the Mixed Desert Shrub Zone. *Douglass s. n.* and *Graham 9156* are unusually robust plants with large fruits but very probably attributable to this species. All of the specimens show fruit, while the May numbers show flowers also.

Flat between Ouray and Quarry "L," 4700 ft., June 21, 1931, *Graham 6180;* bench W. of Green River, S. of Uteland Butte, 4800 ft., May 16, 1935, *Graham 8876;* Greasewood flat above marsh, mouth of Ashley Creek, 4800 ft., May 30, 1935, *Graham 9013;* Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9156;* desert 5 mi. E. of Lapoint, 5700 ft., June 22, 1935, *Graham 9305;* Dry Run, Red Bluff Wash, Dragon-Vernal road between White and Green Rivers, June 27, 1908, *Douglass s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Tripterocalyx pedunculatus (M. E. Jones) Standley

Abronia micrantha pedunculata M. E. Jones

Collected only from the locality cited; the specimen is in flower.

In sand at base of rocky bench, Uteland Mine, 4800 ft., May 17, 1935, *Graham 8896.*

Allionia linearis Pursh See N. Am. Flora **21**: 222. 1918.

Allionia glandulifera A. Nels.

An infrequent but widely distributed species throughout the Basin. The specimens show varying stages of both flower and fruit.

Ridge between head of Post Canyon and Florence Canyon, 8200 ft., July 29, 1935, *Graham 9910;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 10012;* Ouray, June 22, 1933, *Doutt 879.*

Hermidium alipes S. Wats.

A frequent plant of shale or rocky slopes throughout the Basin at low altitudes. The May specimens show varying stages of anthesis; the June number is in late fruit.

Talus slope, S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7874;* bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7930;* Leota road near Highway U. S. 40, 15 mi. SW. of Vernal, 5000 ft., May 21, 1935, *Graham 8912;* Willow Creek, 2 mi. above Thorne's ranch, 5300 ft., June 29, 1933, *Doutt 888.*

PORTULACACEAE

Claytonia lanceolata Pursh SPRING BEAUTY, GROUND NUT

An infrequent plant of Aspen woodlands in the Uinta Mountains. The specimens all show flowers and *Graham 9249* is in fruit as well.

Along Pot Creek road, NE. of Little Brush Creek Knob, 7500 ft., June 7, 1933, *Graham 8119;* east side of Wolf Creek Pass, 9400 ft., June 16, 1933, *Graham 8146;* Horse Creek, 7700 ft., June 18, 1935, *Graham 9249.*

Oreobroma pygmaea (A. Gray) Howell BREAD ROOT

Calandrinia pygmaea A. Gray

Oreobroma Grayi (Britt.) Rydb.

An infrequent plant of mid- and upper altitude meadows in the Uinta Mountains. The specimens all show flowers and developing fruit.

Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8015;* meadow below Trout Creek Ranger Station, 9000 ft., June 22, 1933, *Graham 8234;* between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 19, 1933, *Graham 8500;* meadow above Chain Lakes, SE. slope of Mt. Emmons, 11,000 ft., July 20, 1933, *Graham 8527.*

CARYOPHYLLACEAE

Alsine baicalensis Coville

Stellaria umbellata Turcz.

This Siberian species occurs as an infrequent plant of rocky situations in upper altitude forests of the Uinta Mts. Both specimens show old fruit.

Along rocky shore, fourth Chain Lake, 11,400 ft., July 20, 1933, *Graham 8560;* among rocks of Island Lake shore, NE. of Paradise Park, 10,200 ft., Aug. 16, 1935, *Graham 10032.*

Alsine borealis (Bigel.) Britt.

Stellaria borealis Bigel.

A frequent species of wet meadows and moist places in mid- and upper altitude forests of the Uinta Mts. *Graham 8631* is in fruit; the remaining specimens are in flower.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6428;* between sheep bridge, Uinta River, and Chain Lakes, 9000 ft., July 23, 1933, *Graham 8631;* SW. of Moon Lake, 8100 ft., June 24, 1935, *Graham 9352;* N. of Robert's Pass, NE. slope of Mt. Emmons, 11,300 ft., July 20, 1933, *Doutt s. n.*

Alsine crispa (Cham. and Schlecht.) Holz.

Collected only at the locality cited; the specimen is in early anthesis.

Ridge NNW. of Paradise Park, 10,500 ft., July 8, 1933, *Graham 8418.*

Alsine Curtisii Rydb.

An infrequent species of mid-altitude woods in the Uinta Mountains. Both specimens are in flower.

Davis Hollow, Taylor Mountain, 8500 ft., June 24, 1931, *Graham 6338;* Diamond Mountain, 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Alsine Jamesiana (Torr.) Heller

Stellaria Jamesiana Torr.

A frequent species of mid- or occasionally upper altitude forests throughout the Basin, especially in Aspen thickets. All of the specimens are in flower, with the September number showing fruit as well.

S. slope of Diamond Mountain, near spring, 6000 ft., June 5, 1933, *Graham 8078;* near Little Lake, 8500 ft., June 22, 1933, *Graham 8226;* Horse Creek, 7700 ft., June 18, 1935, *Graham 9266;* head of West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9662;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10217.*

Alsine laeta (Richards.) Rydb.

Infrequent in moist meadows of the Spruce-Fir Zone in the Uinta Mountains. Both specimens are in flower.

Between E. ridge of Mt. Emmons and Chain Lakes, 11,300 ft., July 19, 1933, *Graham 8503;* small lake east of first Chain Lake, 10,500 ft., July 23, 1933, *Graham 8649.*

Alsine longifolia (Muhl.) Britt.

This Eurasian species occurs infrequently in moist areas of upper altitude forests in the Uinta Mountains. *Graham 6559* is in fruit; the other specimens are in flower.

Up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6544, Graham 6559;* on trail near Dry Fork Creek W. of Marsh Peak, 10,000 ft., July 10, 1933, *Graham 8447.*

Alsine longipes (Goldie) Cov.

Stellaria longipes Goldie

Whiterocks, Uintah County, 6000 ft., May 17, 1914, *DeMoisy Jr. 18,* USFS 18915; Moon Lake, Duchesne County, 8000 ft., June 10, 1928, *Starr 3,* USFS 60979.

Arenaria Burkei Howell

Arenaria congesta subcongesta S. Wats.

Arenaria subcongesta Rydb.

A frequent species of dry situations in mid- and upper altitudes in the Uinta Mountains. The specimens cited show varying stages of anthesis.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6301;* W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6485;* near Little Lake, 8300 ft., June 23, 1933, *Graham 8248;* Blanchard Park, head of

Dry Fork Creek, 10,000 ft., July 5, 1933, *Graham 8390;* between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 19, 1933, *Graham 8477;* head of West Fork of Whiterocks River, 11,600 ft., Aug. 21, 1935, *Graham 10112.*

Arenaria congesta Nutt.

The single specimen cited is in late anthesis.

Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Arenaria Eastwoodiae Rydb.

An infrequent plant of low altitudes throughout the Basin. The May specimens are in flower; the June specimen is in fruit; the August number shows both flowers and mature capsules.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6276;* bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7932;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6000 ft., May 31, 1935, *Graham 9038;* NE. of Dinosaur Quarry, May 30, 1912, *Peterson s. n.;* Red Creek, 2 mi. N. of Fruitland, 6700 ft., Aug. 14, 1936, *Doutt 4319.*

Arenaria Hookeri Nutt.

Arenaria pinetorum A. Nels.

An infrequent plant of low or occasionally mid-altitudes throughout the Basin. It grows in solid, tufted mats sometimes two feet across, usually in dry, more or less rocky, open situations. *Graham 8790* is a vegetative specimen; the other numbers show varying stages of anthesis.

Bench, head of Sand Wash, 5300 ft., May 30, 1933, *Graham 7964;* head of Smith Wells Draw, 7500 ft., June 28, 1933, *Graham 8324;* N. side of White River, 4 mi. NE. of mouth of Evacuation Creek, 5400 ft., May 8, 1935, *Graham 8790;* divide between Smith Wells Draw and head of Minnie Maud tributary, 7100 ft., July 5, 1935, *Graham 9501.*

Arenaria propinqua Richards.

Alsinopsis propinqua (Richards.) Rydb.

Arenaria aequicaulis A. Nels.

The single specimen cited, from near timber line in the Uinta Mts., is in flower.

Between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 19, 1933, *Graham 8498.*

Arenaria sajanensis B. L. Robins., not Willd.

Alsinopsis obtusiloba Rydb.

Arenaria obtusa Torr., not All.

The single specimen cited is in flower.

Meadow E. side of Paradise Park, 10,000 ft., July 4, 1933, *Graham 8366.*

Cerastium Buffumae A. Nels.

A single fruiting specimen was collected at the locality cited, where it was growing in a moist meadow along the creek.

Paradise Park, 10,000 ft., Aug. 16, 1935, *Graham 10052.*

Cerastium oreophilum Greene

A frequent plant throughout moist woodland and meadows in mid- and upper altitude zones of the Uinta Mts. All of the specimens are in flower. No attempt has been made to differentiate the aggregate here represented into various segregates of *Cerastium arvense* L.

Up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6553;* Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8008;* Big Park, Uinta River Canyon, 7500 ft., June 2, 1933, *Graham 8071;* Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8185;* SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9339;* head of West Fork of Whiterocks River, 12,000 ft., Aug. 21, 1935, *Graham 10129.*

Lychnis Drummondii S. Wats.

Silene Drummondii Hook.

Wahlbergella Drummondii (Hook.) Rydb.

Infrequent throughout the Basin in mid- and upper altitudes. Both specimens show old flowers and maturing capsules.

Between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 20, 1933, *Graham 8553;* head of Hill Creek, 8500 ft., July 31, 1935, *Graham 9948.*

Lychnis Kingii S. Wats.

Wahlbergella Kingii (S. Wats.) Rydb.

Infrequent in the Uinta Mts. near and above the timber line. The species is endemic to Utah. Both specimens are in flower.

Between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 19, 1933, *Graham 8481;* meadow N. of Chain Lakes, 11,400 ft., July 20, 1933, *Graham 8571.*

Moehringia lateriflora (L.) Fenzl

Arenaria lateriflora L.

This north Eurasian species is infrequent throughout the mid-altitude woodlands of the Uinta Mts. It usually occurs in moist parts of Aspen thickets. All of the specimens cited are in flower, and *Graham 9449* has its anthers infected with the smut, *Ustilago violacea* (Pers.) Tckl.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6433*, *Graham 6463;* SW. of Moon Lake, 8100 ft., June 24, 1935, *Graham 9354;* W. side of Red Creek, 7500 ft., June 27, 1935, *Graham 9449*.

Paronychia pulvinata A. Gray WHITLOW-WORT

An infrequent species of upper altitudes in the Uinta Mts., especially in open dry meadows near or above the tree line. All of the specimens are in flower.

Blanchard Park, 10,000 ft., July 5, 1933, *Graham 8404;* ridge NNW. of Paradise Park, 11,000 ft., July 8, 1933, *Graham 8437;* meadow above trees, SE. slope of Mt. Emmons, 11,400 ft., July 20, 1933, *Graham 8562*.

Sagina saginoides (L.) Britt. PEARLWORT

Sagina Linnaei Presl

Spergula saginoides L.

This Eurasian species is infrequent in mid- and upper altitude forests of the Uinta Mts.; it occurs in moist, rocky situations. The specimens show varying stages of anthesis.

Between sheep bridge, Uinta River, and Chain Lakes, 8300 ft., July 23, 1933, *Graham 8640;* Paradise Park, 10,000 ft., Aug. 16, 1935, *Graham 10056;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10251*.

Silene acaulis var. **subacaulescens** (F. N. Williams) Fernald and St. John See Rhodora **23**: 119-120. 1921. MOSS CAMPION

A frequent plant of rocky, alpine situations of the Uinta Mts. where it is usually found above the timber line among the broken quartzite blocks which form the crest of the range. All of the specimens are in flower.

Slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6645;* ridge NNW. of Paradise Park, 11,000 ft., July 8, 1933, *Graham 8442;* head of West Fork of Whiterocks River, 12,000 ft., Aug. 21, 1935, *Graham 10130*.

Silene Menziesii Hook. CATCHFLY

A frequent species throughout the Basin in mid- and sometimes upper altitudes, usually in Apsen woodland. *Graham 9895* is in fruit, the other specimens are in flower. The species was also collected (*Graham 8338*) on the south slope of the Book Cliffs in Pine Canyon.

Dry Fork, in Juniper Zone, 7000 ft., June 26, 1931, *Graham 6389;* low ridge just below Moon Lake, 8000 ft., June 25, 1935, *Graham 9378;* Rock Creek, 9200 ft., June 11, 1935, *Graham 9596, Graham 9609;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9895.*

NYMPHAEACEAE

Nymphaea polysepala (Engelm.) Greene YELLOW POND LILY,
Nuphar polysepala Engelm. SPATTER-DOCK, WOKAS

Frequent in small glacial lakes in the Uinta Mts. in the Lodgepole Pine and Spruce-Fir Zones. In those lakes which have reached an advanced stage of vegetational occupation, the water of the lake center may be nearly covered with the leaves of this species. The July specimen is in bud; the August number shows both flowers and well developed fruit.

Lake E. of Paradise Park, 10,200 ft., July 4, 1933, *Graham 8384;* lake NE. of Paradise Park, 10,200 ft., Aug. 16, 1935, *Graham 10038.*

RANUNCULACEAE

Aconitum columbianum Nutt. ACONITE, MONKSHOOD, WOLFSBANE
Aconitum vestitum Greene

An infrequent plant of mid- and upper altitude woodlands throughout the Basin. It usually grows in moist shaded places, preferably in wet meadows or along wooded streams. All of the specimens are in flower except *Graham 10239,* which is in fruit.

While this plant will poison sheep and horses, it is believed not to be serious on the range. In the Uinta Basin it is of such sporadic occurrence that its danger is negligible. Losses due to poisoning from its somewhat similar relative, Delphinium, are of much more serious consequences.

Up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6527;* near head of West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9643;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9877;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10203, Graham 10239;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Actaea arguta Nutt. BANEBERRY

Actaea eburnea Rydb.

Infrequent throughout the Basin in mid-altitude woodlands, usually in moist, shaded spots. All of the specimens show developing fruits, except *Graham 9342*, which exhibits flowers in late anthesis.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6424;* W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6511;* SW. of Moon Lake, 8100 ft., June 24, 1935, *Graham 9342;* head of West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9656.*

Anemone cylindrica A. Gray ANEMONE, WINDFLOWER

Infrequent in moist areas along streams at low altitudes. Both specimens show flowers and developing achenes as well.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6242;* Uinta River along Lapoint-Neola road, 5700 ft., June 22, 1935, *Graham 9298.*

Anemone globosa Nutt.

Anemone multifida Hook., in part, not Poir.

Infrequent in meadow patches of mid- and upper altitudes in the Uinta Mts., especially in open alpine meadows near and above tree line. *Graham 6306* and *8440* are in flower; the other specimens are in fruit.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6306;* ridge NNW. of Paradise Park, 10,500-11,000 ft., July 8, 1933, *Graham 8440;* meadow N. of Chain Lakes, SE. slope of Mt. Emmons, 11,400 ft., July 20, 1933, *Graham 8573;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Aquilegia coerulea James COLUMBINE

Common throughout the Basin in Aspen woodlands and occasionally at higher altitudes up to tree line (*Graham 6635*). No attempt is here made to differentiate this species from its white form (*A. coerulea* var. *albiflora* Gray), as both seem to occur promiscuously throughout the Aspen Zone of the Basin. The Columbine is the state flower of Colorado. A specimen (*Graham 8306*) was also collected on the south slope of the Book Cliffs in Pine Canyon. *Graham 9666* and *9871* show mature capsules; the other specimens are in flower.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6304;* S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6465;* slope above

Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6635* (while this specimen was collected in the Alpine Zone above the trees and is therefore somewhat dwarfed, it nevertheless seems to be an individual of *A. coerulea* occurring above its normal altitudinal range); near Little Lake, 8300 ft., June 23, 1933, *Graham 8241;* Horse Creek, 7700 ft., June 18, 1935, *Graham 9253;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9474;* Rock Creek, 9200 ft., July 11, 1935, *Graham 9603;* West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9666* (sheet "a" shows fruit; sheet "b" of same number shows flowers); Post Canyon, 7800 ft., July 28, 1935, *Graham 9871;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Aquilegia chrysantha A. Gray See Contr. U. S. Nat. Herb. **20**: 156. 1918.

Aquilegia thalictrifolia Rydb.

The single specimen cited shows both flowers and maturing capsules.

N. slope of E. side-canyon, 16 mi. up Indian Canyon road from (SW. of) Duchesne, 6800 ft., June 28, 1935, *Graham 9456.*

Aquilegia formosa Fisch. See Contr. U. S. Nat. Herb. **20**: 142. 1918.

The single specimen cited shows both flowers and mature capsules.

Crack of rock cliff, Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 10009.*

Aquilegia pallens Payson

The following specimen is in the herbarium of F. J. Hermann at Ann Arbor, Michigan: above Little Brush Creek Canyon, 7000 ft., July 12, 1933, *Hermann 4911* (also in Mo. Bot. Gard.).

Caltha rotundifolia (Huth) Greene MARSH MARIGOLD

Frequent in wet meadows of the Lodgepole Pine and Spruce-Fir forests of the Uinta Mts. The specimens are in flower except *Graham 10100* which shows fruit only and *Doutt 4351* which exhibits both flowers and fruit.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6612;* east side of Wolf Creek Pass, 9400 ft., June 16, 1933, *Graham 8145;* Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8199;* Chepeta Lake, 10,600 ft., Aug. 21, 1935, *Graham 10100;* Petty Mt., 15 mi. N. of Mountain Home, 10,000 ft., Aug. 22, 1936, *Doutt 4351.*

Clematis columbiana (Nutt.) Torr. and Gray

Atragene columbiana Nutt.
Atragene occidentalis Rydb. not Hornem.
Clematis verticillaris columbiana A. Gray

The single specimen cited, which was collected in Aspen woodland, is in flower.

SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9328*.

Clematis hirsutissima Pursh

Clematis Douglasii Hook.
Viorna hirsutissima (Pursh) Heller

Frequent throughout the Basin at mid-altitudes where it is usually found among Sagebrush of the Sub-montane Shrub Zone or in Aspen thickets. *Graham 8243*, *9235*, and *9537* are in flower; the other numbers are in fruit except *Graham 9725* which shows both flowers and fruit.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6308;* near Little Lake, 8300 ft., June 23, 1933, *Graham 8243;* SE. slope of Mosby Mt., 8000 ft., July 3, 1933, *Graham 8344;* Horse Creek, 7700 ft., June 18, 1935, *Graham 9235;* SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9314;* Willow Springs, 9600 ft., July 10, 1935, *Graham 9537;* middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9725*.

Clematis ligusticifolia Nutt. VIRGIN'S BOWER

Common throughout the Basin along wooded streams of low altitude, where it often occurs in great masses climbing over shrubs and low growth. *Graham 6212* and *Douglass s. n.* are vegetative specimens; the other June and July numbers are in flower, while those of August and September exhibit fruit.

West side of Green River, near Quarry "L," 4700 ft., June 22, 1931, *Graham 6212;* W. side of Green River, near Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7355;* Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7384;* Cottonwood Creek, 5800 ft., July 6, 1935, *Graham 9518;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9785;* White River bottom near Utah-Colorado state line, July 6, 1908, *Douglass s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.;* Uinta Basin, July 13, 1912, *Peterson s. n.*

Clematis pseudoalpina (Kuntze) A. Nels.

Atragene repens (Kuntze) Rydb.

Scarce throughout the Basin in loose rocky slopes of mid-altitudes. Both specimens are in flower.

Ridge just below Moon Lake, 8000 ft., June 25, 1935, *Graham 9380;* rocky slope, E. rim of Range Creek, near Willow Springs, 9700 ft., July 12, 1935, *Graham 9622.*

Delphinium bicolor Nutt.

An infrequent plant throughout the Basin. *Graham 9119* shows flowers and fruit and is questionably determined; the other specimen shows fruit only.

Head of Deep Channel Creek, Colo., 6400 ft., June 4, 1935, *Graham 9119*; Uinta Basin, June 9, 1912, *Peterson s. n.*

Delphinium cucullatum A. Nels. DUNCE-CAP, TALL LARKSPUR

These specimens are questionably named, as they are both vegetative in very young condition. This species represents the tall larkspurs, which continue to grow after flowering until frost, in contradistinction to the low larkspurs, which usually die down after flowering. This species, with *D. occidentale* and *D. reticulatum*, represent the tall larkspurs of the Uinta Basin; the other species listed represent low larkspurs. While both groups are considered poisonous to horses and cattle, the tall species are believed to be less so after flowering.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6427;* Horse Creek, 7700 ft., June 18, 1935, *Graham 9264.*

Delphinium dumetorum Greene

Collected only in the southern part of the Basin; both specimens show flowers and fruit. The species is apparently new to Utah, having been known previously only from Colorado. At Horse Creek we observed hummingbirds working on the flowers of this species. *Graham 9222* is close to *Delphinium dumetorum*, and is here treated as such, although it is atypical. A specimen (*Graham 8101*) was also collected in Jackson Draw, on the north slope of the Uinta Mts.

Head of Horse Creek, 7800 ft., June 17, 1935, *Graham 9222;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9497.*

Delphinium Geyeri Greene

The single specimen cited is in fruit, with a few old flowers persisting.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6333.*

Delphinium Menziesii DC. LOW or SPRING LARKSPUR

A common species throughout the Basin at low and mid-altitudes. All of the specimens are in flower, with *Graham 8056* showing immature fruit as well.

This species is probably the most destructive of the low larkspurs because it is so abundant throughout Colorado and Utah, all members of the genus being very poisonous, especially to cattle. All parts of the plant are toxic, the seeds especially so.

Hills E. of Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7692;* Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8027;* Junction of Juniper and Aspen Zones, Uinta River Canyon, 7000 ft., June 2, 1933, *Graham 8056;* bench W. of Bitter Creek along Ouray-Watson road, 6000 ft., May 27, 1935, *Graham 9004.*

Delphinium Nelsonii Greene

A frequent species of mid-altitudes throughout the Basin. *Graham 9561* is very floriferous, and therefore atypical. *Graham 8222* is in flower; the other numbers show flowers and varying stages of maturing capsules.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6448;* near Little Lake, 8500 ft., June 22, 1933, *Graham 8222;* burned-over ridge, S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6500 ft., June 1, 1935, *Graham 9054;* Willow Springs, 9550 ft., July 10, 1935, *Graham 9561.*

Delphinium occidentale Wats. TALL LARKSPUR

The single specimen cited is in bud, and is therefore questionably determined.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6377.*

Delphinium reticulatum (A. Nels.) Rydb. TALL LARKSPUR

The single specimen cited is in flower; it was collected in Aspens.

Middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9739.*

Delphinium virescens Nutt. sens latus WHITE or PLAINS LARKSPUR

Delphinium albescens Rydb.

The single specimen cited is in flower.

Post Canyon, 7700 ft., June 1, 1935, *Thorne s. n.*

Pulsatilla ludoviciana (Nutt.) Heller PASQUE FLOWER, BLUE TULIP, WILD CROCUS, LION'S BEARD (fruit)

Yellowstone Pass, 11,500 ft., June 17, 1926, *Lambert and Woods 20*, USFS 54297.

Ranunculus alpeophilus A. Nels.

The single flowering specimen cited was collected in the extreme west end of the Basin.

Horse Creek, 7700 ft., June 18, 1935, *Graham 9237*.

Ranunculus calthaeflorus Greene

Collected only at the locality cited, in the extreme west end of the Basin in the Uinta Mts. *Graham 8149* was flowering in a wet meadow in run-off from a melting snow bank near the summit of the Pass; it is in flower, while the other specimen, collected nearby, shows both flowers and maturing achenes.

Rocky slope, E. side of Wolf Creek Pass, 9000 ft., June 16, 1933, *Graham 8138;* E. side of Wolf Creek Pass, 9400 ft., June 16, 1933, *Graham 8149*.

Ranunculus cardiophyllus Hook.

Ranunculus affinis validus A. Gray

The single flowering specimen cited was collected in a Uinta Mt. river canyon.

Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8023*.

Ranunculus Cymbalaria Pursh var. **saximontanus** Fernald See Rhodora **16**: 160-163. 1914.

Common in moist areas and swamps throughout the Basin at low and occasionally mid-altitudes. It was also collected (*Graham 8336*) on the south slope of the Book Cliffs in Pine Canyon. *Graham 9882, 7428* and *Douglass s. n.* are in fruit; *Graham 7759, 8980, 8905, 9349* are in flower; the remaining numbers exhibit both flowers and maturing achenes. *Graham 7480* tends more toward the species than toward its variety.

West side of Green River, near Quarry "L," 4700 ft., June 18, 1931, *Graham 6073;* W. side of Green River, near Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7350;* Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7428;* Davis Hollow, Taylor Mt., 8700 ft., Sept. 7, 1931, *Graham 7480;* Orchid (Mud) Springs Canyon,

5000 ft., May 20, 1933, *Graham 7759;* W. side of Green River, Uteland Mine, 4800 ft., May 17, 1935, *Graham 8905;* in swamp along road, Willow Creek, below Watson road, 5300 ft., May 25, 1935, *Graham 8980;* marsh, mouth of Ashley Creek, 4750 ft., May 30, 1935, *Graham 9026;* SW. of Moon Lake, 8100 ft., June 24, 1935, *Graham 9349;* along road, Red Creek Valley, 7500 ft., June 26, 1935, *Graham 9420;* head of West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9658;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9882;* White River bottom near Utah-Colorado state line, July 6, 1908, *Douglass s. n.;* Red Creek, 2 mi. N. of Fruitland, 6700 ft., Aug. 16, 1936, *Doutt 4333.*

Ranunculus glaberrimus Hook. var. **ellipticus** (Greene) Greene

Frequent in moist meadows of mid-altitudes in the Uinta Mts. *Graham 8021* is in fruit; *Graham 8118* shows both flowers and maturing achenes; the other specimens are in flower.

Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8021, Graham 8025;* Pot Creek road, NE. of Little Brush Creek Knob, 8000 ft., June 7, 1933, *Graham 8118;* Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8202.*

Ranunculus inamoenus Greene

Ranunculus affinis A. Gray, not Hook.

A frequent plant of upper and mid-altitudes throughout the Basin. *Graham 7797, 8004, 8133,* and *8201* are in flower; the other numbers all show mature achenes.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6339;* Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7797;* Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 8004;* grassy meadow, E. side of Wolf Creek Pass, 9400 ft., June 16, 1933, *Graham 8133;* Aspen slope, E. side of Wolf Creek Pass, 9000 ft., June 16, 1933, *Graham 8143;* meadow at Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8201;* Horse Creek, 7700 ft., June 18, 1935, *Graham 9258;* Red Creek Valley, 7500 ft., June 26, 1935, *Graham 9416;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9476;* meadow NW. of Willow Springs, 9550 ft., July 10, 1935, *Graham 9578;* along Rock Creek below Willow Springs, 9200 ft., July 11, 1935, *Graham 9610;* head of West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9681.*

Ranunculus Macounii Britt.

An infrequent species collected only on the Tavaputs Plateau where it grew at the edges of streams in Aspen woodlands. *Graham 9686* shows both flowers and fruit; the other specimen exhibits mature achenes only.

West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9686;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9887.*

Ranunculus reptans L. var. **strigulosus** Freyn

Infrequent in the Uinta Mts. where it grows in mud or wet situations along streams or at lake edges in upper or mid-altitude forest zones. All of the specimens are in flower.

Up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6541;* Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6572;* muddy edge of small lake E. of Paradise Park, 10,000 ft., July 6, 1933, *Graham 8411.*

Ranunculus sclereratus L. var. **multifidus** Nutt.

Collected only at the locality cited where it grew in the wet margin of an extensive Scirpus-Typha swamp along the Green River. Both specimens show flowers and fruit.

Marsh, mouth of Ashley Creek, 4750 ft., May 30, 1935, *Graham 9012;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9816.*

Ranunculus trichophyllus Chaix var. **typicus** Drew See Rhodora **38**: 18. 1936. WATER CROWFOOT

The single specimen cited shows both flowers and fruit; the species was also observed in the outlet stream below Paradise Park reservoir.

West Fork of Whiterocks River, below Queant Lake, 10,300 ft., Aug. 22, 1935, *Graham 10132.*

Thalictrum Fendleri A. Gray

Frequent throughout the Basin in mid- or occasionally upper altitude forests, especially in Aspen woodland. It was also collected (*Graham 8307*) in Pine Canyon on the south slope of the Book Cliffs. *Graham 6507* and *10002* are in fruit; the other specimens represent flowering staminate plants.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6305;* W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6507;* E. slope of Wolf Creek Pass, 9000 ft., June 16, 1933, *Graham 8150;* Horse Creek, 7700 ft., June 18, 1935, *Graham 9269;* ridge just below Moon Lake, 8000 ft., June 25, 1935, *Graham 9377;* below Mud Springs, 8800 ft.,

June 29, 1935, *Graham 9479;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 10002.*

Thalictrum sparsiflorum Turcz.

Thalictrum utahense Greene

This species, also found in northern Asia, is infrequent in the Uinta Mts. in moist areas of Lodgepole Pine and Spruce-Fir forests. The July specimen is in flower; that of August is in fruit.

W. side of second and third Chain Lakes, 10,700 ft., July 22, 1933, *Graham 8604;* between Chepeta Lake and Paradise Park, 10,300 ft., Aug. 20, 1935, *Graham 10087.*

Trollius albiflorus (A. Gray) Rydb. GLOBE FLOWER

Infrequent in the Uinta Mts. where it occurs in wet meadows and other moist areas of Lodgepole Pine or Spruce-Fir forests. The June specimen is in flower; the July number shows immature, the September number mature fruit.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6599;* Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8175;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10237.*

BERBERIDACEAE

Odostemon Aquifolium (Pursh) Rydb. OREGON GRAPE

Berberis Aquifolium Pursh

Berberis nana and *Berberis brevipes* Greene

Berberis repens Lindl.

Frequent throughout the Basin in shaded, rocky areas of mid-altitudes. The May specimens are in flower; the later numbers are in fruit.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6347;* S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6449;* Orchid (Mud) Springs Canyon, 5000 ft., May 20, 1933, *Graham 7752;* Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 8002;* between U ranch and sheep bridge, Uinta River Canyon, 8300 ft., July 23, 1933, *Graham 8620;* ridge W. of head of Post Canyon, 8200 ft., July 27, 1935, *Graham 9849;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 10006;* Yellowstone (East Fork of Lake Fork) Creek, 12 mi. N. of Mountain Home, 7800 ft., Aug. 18, 1936, *Doutt 4338.*

PAPAVERACEAE

Capnoides aureum (Willd.) Kuntze

Corydalis aurea Willd.

Infrequent in the Uinta Mts. and west end of the Basin in mid-altitude woodlands. Both specimens show flowers, the July number possessing fruit as well.

Between sheep bridge, Uinta River, and Chain Lakes, 9000 ft., July 23, 1933, *Graham 8635;* Horse Creek, 7500 ft., June 19, 1935, *Graham 9287.*

Capnoides montanum (Engelm.) Britt.

Corydalis aurea occidentalis Engelm.

Infrequent throughout the Basin at low and mid-altitudes. Both specimens show flowers and immature fruit.

Talus slope, S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7882;* Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8014.*

CAPPARIDACEAE

Cleome lutea Hook. YELLOW BEE FLOWER, STINK FLOWER

Peritoma luteum (Hook.) Raf.

Common in sandy areas throughout the Mixed Desert Shrub Zone, where, in May or early June, it may color the desert for miles, being then responsible for a late vernal aspect in associations at other seasons quite colorless. *Graham 6099, 6189a, 7390, Doutt 876* and *Douglass s. n.* (June 27) show both flowers and fruit; the remaining specimens are in flower.

W. side of Green River, near Quarry "L," 4700 ft., June 18, 1931, *Graham 6074;* between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6099;* flat between Ouray and Quarry "L," 4700 ft., June 21, 1931, *Graham 6189a;* Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6275;* Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7390;* Orchid (Mud) Springs Canyon, 5000 ft., May 20, 1933, *Graham 7756;* Skull Pass Quarry, 5000 ft., May 18, 1933, *Graham 7828;* Pariette Mine, 10 mi. SE. of Myton, 5000 ft., May 26, 1933, *Graham 7851;* in sand, base of Uteland Bench, Uteland Mine, 4800 ft., May 17, 1935, *Graham 8901;* Pariette Bench, 12 mi. SW. of Ouray, 5000 ft., June 22, 1933, *Doutt 876;* Red Bluff Wash between White and Green Rivers, May 27, 1908, *Douglass*

s. n.; Dry Run, Red Bluff Wash, along Dragon-Vernal road between Green and White Rivers, June 27, 1908, *Douglass s. n.;* Ainge Gulch, 5 mi. N. of Jensen, May 29, 1912, *Peterson s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Cleome serrulata Pursh PURPLE BEE FLOWER

Peritoma serrulatum (Pursh) DC.

Frequent throughout the Basin in sandy areas of low and mid-altitudes. It never occurs within the Basin in such masses as the preceding species. *Graham 7389* and *9768* are in flower; the other specimens show both flowers and developing capsules.

West side of Green River, near Quarry "L," 4700 ft., June 22, 1931, *Graham 6214;* W. side of Green River, near Quarry "L," 4700 ft., Aug. 29, 1931, *Graham 7312;* Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7389;* middle fork of Stuart Creek, Colo., 7000 ft., July 19, 1935, *Graham 9768.*

Cleomella Palmerana M. E. Jones

The single specimen cited, collected in the Mixed Desert Shrub Zone, shows both flowers and fruit.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6124.*

Polanisia trachysperma Torr. and Gray

Jacksonia trachysperma (T. and G.) Greene

Infrequent throughout the Basin in Mixed Desert Shrub sandy areas of low altitude. *Graham 6150* and *Peterson s. n.* (July 13) are in flower, the former being a dwarf plant; the other two specimens show both flowers and fruit.

Flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6150;* mouth of Chandler Canyon, Green River, in Desolation Canyon, 4500 ft., Aug. 2, 1935, *Graham 9965;* Uinta Basin, July 11, 1912, *Peterson s. n.;* Uinta Basin, July 13, 1912, *Peterson s. n.*

CRUCIFERAE

Arabis Drummondii Gray

A frequent plant of mid- and upper altitudes throughout the Basin. *Graham 9827* shows mature fruit; *Graham 6341, 6588* and *8561b* are in flower; the remaining specimens exhibit both flowers and developing siliques.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6311*, *Graham 6341;* Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6579*, *Graham 6588;* near Little Lake, 8500 ft., June 22, 1933, *Graham 8231;* between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 20, 1933, *Graham 8561b;* meadow-pasture NW. of Willow Springs, 9600 ft., July 10, 1935, *Graham 9538;* Post Canyon, 8000 ft., July 27, 1935, *Graham 9827*.

Arabis formosa Greene

A frequent plant of the Mixed Desert Shrub Zone. The 1933 specimens are in flower; the other numbers all show flowers and developing siliques.

Three miles E. of Dinosaur Quarry, 5500 ft., May 15, 1933, *Graham 7666;* hills E. of Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7708;* S. edge of Leland Bench just N. of Pariette Creek, 5000 ft., May 14, 1935, *Graham 8841;* rocky bench W. of Green River, just S. of Uteland Butte, 4800 ft., May 16, 1935, *Graham 8877;* hills and ravines E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.*

Arabis glabra (L.) Bernh.

Turritis glabra L.

This European introduction was collected only in the extreme west end of the Basin. Both specimens show flowers and developing siliques.

Along road, Red Creek valley, 7500 ft., June 26, 1935, *Graham 9432;* W. side of Red Creek valley, 7500 ft., June 27, 1935, *Graham 9438*.

Arabis Lemmonii Wats.

A frequent plant throughout most of the altitudinal zones in the Basin. The August specimen shows fully matured siliques; *Graham 7536* and *8777* are in flower; the remaining numbers exhibit flowers and developing siliques; *Graham 8470* was collected at an exceptionally high altitude for the species and is atypical.

Along Green River below Jensen, 5000 ft., April 27, 1933, *Graham 7536;* Asphalt Ridge SW. of Vernal, 6000 ft., May 1, 1933, *Graham 7579;* Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7796;* SE. slope of Mt. Emmons, 12,000 ft., July 18, 1933, *Graham 8470;* N. side of White River, 4 mi. NE. of mouth of Evacuation Creek, 5300 ft., May 7, 1935, *Graham 8777;* rocky E. bluff of Whiterocks Canyon between Red Pine and Paradise Creeks, 10,000 ft., Aug. 17, 1935, *Graham 10062*.

Arabis Lyallii Wats.

The following specimens of this species are situated as indicated: above timber line, SE. slope of Mt. Emmons, 11,300 ft., July 18, 1933, *Hermann 4948* (in U. S. Nat. Herb.), *Hermann 5004½* (in Univ. Mich.); dry, rocky slope of fourth Chain Lake, 11,200 ft., July 20, 1933, *Hermann 5089* (in herbarium of F. J. Hermann at Ann Arbor, Michigan, Mo. Bot. Gard., Gray Herb., and Univ. Wyo.).

Arabis perennans Wats.

A single specimen was collected west of the Dinosaur Quarry; it shows flowers and developing siliques.

Orchid (Mud) Springs Canyon, 5000 ft., May 20, 1933, *Graham 7749*.

Arabis retrofracta Graham

Arabis Holboellii Am. auth.

A common species throughout the Basin at low and mid-altitudes. *Graham 7554* and *7977* are in flower; *Graham 6460* and *9470* exhibit mature siliques only; the remaining specimens show both flowers and developing capsules, those of *Graham 7778* and *9059* being nearly mature.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6460;* Dinosaur Quarry, 5000 ft., April 28, 1933, *Graham 7554;* sand hills out Maeser road, 6000 ft., May 2, 1933, *Graham 7591;* bad lands N. of Skull Pass Quarry, 5000 ft., May 9, 1933, *Graham 7629;* 3 mi. E. of Dinosaur Quarry, 5500 ft., May 15, 1933, *Graham 7657;* Cottonwood Springs, Little Mt., 6600 ft., May 22, 1933, *Graham 7778;* Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7977;* Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8038;* Dry Fork Creek just above Dry Fork town, 6700 ft., May 12, 1935, *Graham 8816;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6500 ft., June 1, 1935, *Graham 9059;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9470*.

Arabis rupestris Nutt.

The single specimen cited was collected near the southern rim of the Basin on the Tavaputs Plateau in a wet meadow at the edge of a small stream; it shows flowers and maturing siliques.

Post Canyon, 7800 ft., July 28, 1935, *Graham 9881*.

Barbarea orthoceras Ledeb. See Rhodora 11: 140. 1909.

Barbarea americana Rydb.

This circum-boreal species was collected only in the Uinta Mts. The May specimen is in bud; the July number shows flowers and developing capsules.

Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 8005;* W. side of second and third Chain Lakes, 10,700 ft., July 22, 1933, *Graham 8605.*

Barbarea stricta Andrzej.

Campe stricta (Andrzej.) W. F. Wight

The single specimen of this Eurasian introduction cited is in fruit.

Between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 20, 1933, *Graham 8556.*

Capsella Bursa-pastoris (L.) Medic. SHEPHERD'S PURSE

Bursa Bursa-pastoris (L.) Britton

A Eurasian introduction as yet uncommon in the Uinta Basin. The specimen shows mature capsules.

Head of West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9661.*

Cardamine cordifolia Gray

The single fruiting specimen cited was collected near the southeastern rim of the Basin.

Head of West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9688.*

Cardamine infausta Greene

Cardamine cardiophylla Rydb., not Greene

Collected only in the vicinity of Moon Lake. The June specimen is in flower; the July specimen shows a few flowers and maturing siliques.

W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6508;* along Brown Duck Creek, SW. of Moon Lake, 8200 ft., June 23, 1935, *Graham 9316.*

Cardamine pennsylvanica Muhl.

The May specimen, *Graham 7979,* was collected on a floating clump of grass above an old beaver dam; it shows flowers and young siliques. The July specimen shows a few flowers and mature siliques.

Along creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6521;* Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7979.*

Caulanthus crassicaulis (Torr.) S. Wats.

A frequent species throughout the Basin at low and occasionally mid-altitudes. It is locally called "Wild Cabbage" or "Bottle Stopper," and the inflated stems are reputed edible. A specimen (*Graham 8106*) was also collected on the north side of the Uinta Mts. in Jackson Draw. *Graham 7834* is in bud; *9036* is in flower; the other specimens show flowers and maturing siliques.

Davis Hollow, Taylor Mt., ? ft., June 24, 1931, *Graham 6329;* Asphalt Ridge, S. of Lapoint road, 6000 ft., May 25, 1933, *Graham 7834;* along Vernal-Manila road N. of Vernal, 6500 ft., June 19, 1933, *Graham 8162;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6000 ft., May 31, 1935, *Graham 9036;* N.-facing slope of E. side-canyon 3 mi. above mouth of Red Creek, 6300 ft., June 19, 1935, *Graham 9285.*

Descurainia brachycarpa (Richards.) O. E. Schulz

Sisymbrium brachycarpum Richards.

Sophia brachycarpa Rydb.

A common species in the Mixed Desert Shrub Zone or occasionally at higher altitudes throughout the Basin. *Graham 7711* is a questionably determined, depauperate specimen; *Graham 8017* is in early anthesis; the other specimens show both flowers and developing siliques.

N. of Dinosaur Quarry, 5500 ft., May 18, 1933, *Graham 7711;* talus slope, W. side of Green River, S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7881;* Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8017;* under Cottonwoods, N. side of White River, 4 mi. NE. of mouth of Evacuation Creek, 5000 ft., May 8, 1935, *Graham 8788;* under Greasewood, Ouray-Watson road near King's Well Draw, 6000 ft., May 27, 1935, *Graham 9002.*

Descurainia californica (Gray) O. E. Schulz

Sisymbrium californicum Wats.

Sophia Sounei Greene

Collected only in the southern part of the Basin near the rim of the Tavaputs Plateau. Both specimens show flowers and developing

siliques, and *Graham 9890* probably represents a variety of the species.

Head of West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9664;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9890.*

Descurainia halictorum (Cockerell) O. E. Schulz

Sophia halictorum Cockerell

A frequent species of the Mixed Desert Shrub Zone throughout the Basin. All of the specimens are in flower, with maturing siliques as well on the Skull Pass Quarry specimens.

Sand hills out Maeser road, 6000 ft., May 2, 1933, *Graham 7584;* flat SE. of Jensen, 5000 ft., May 5, 1933, *Graham 7603;* sandy flat S. of Skull Pass Quarry, 5000 ft., May 9, 1933, *Graham 7624;* bad lands N. of Skull Pass Quarry, 5000 ft., May 9, 1933, *Graham 7628;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9089.*

Descurainia halictorum var. **andrenarum** (Cockerell) O. E. Schulz

Sisymbrium canescens A. Gray

Sophia andrenarum Cockerell

The single specimen cited is in early anthesis.

In sandy wash, Dry Fork Creek just above Dry Fork town, 6700 ft., May 12, 1935, *Graham 8811.*

Descurainia halictorum var. **osmiarum** (Cockerell) O. E. Schulz

Sophia andrenarum Cockerell var. *osmiarum* Cockerell

A frequent species in the Mixed Desert Shrub Zone. All of the specimens cited show matured siliques. The variety is here reported from Utah for the first time.

Flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6154;* NE. of Dinosaur Quarry, May 30, 1912, *Peterson s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Descurainia incisa (Engelm.) Britt.

Sisymbrium incisum Engelm.

Sophia incisa Greene

The single specimen cited was collected in the west end of the Basin; it shows flowers and young siliques.

On hill among Sagebrush, W. side of Red Creek valley, 7500 ft., June 27, 1935, *Graham 9447.*

Descurainia longipedicellata (Fourn.) O. E. Schulz
Sisymbrium incisum filipes A. Gray
Sophia filipes (A. Gray) Heller

The following specimen is in the herbarium of the Missouri Botanical Garden: Ashley Creek Canyon, 10 mi. NW. of Vernal, July 14, 1933, *Hermann 4918.*

Descurainia Richardsonii (Sweet) O. E. Schulz
Sisymbrium Richardsonii Sweet
Sophia brevipes Rydb.
Sophia Hartwegiana Greene

The single specimen cited shows flowers and developing siliques.
Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8019.*

Descurainia serrata (Greene) O. E. Schulz
Sophia serrata Greene

Because it is in early anthesis without siliques the single specimen cited is questionably referred to this species, which has not previously been reported from Utah.
S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6422.*

Draba aurea Vahl

This European plant is a frequent species in the Alpine Zone of the Uinta Mts. near timber line. *Graham 8453* is in flower; the other two specimens show both flowers and fruit.
Meadow, W. slope of Marsh Peak, 11,000 ft., July 10, 1933, *Graham 8453;* between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 19, 1933, *Graham 8488;* between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 20, 1933, *Graham 8561a.*

Draba cana Rydb.
Draba valida Goodding

The following specimen is in the herbarium of F. J. Hermann at Ann Arbor, Michigan: above timber line, SE. slope of Mt. Emmons, 11,340 ft., July 19, 1933, *Hermann 5004.*

Draba crassifolia Graham

The single specimen cited was collected in the upper Spruce-Fir Zone of the Uinta Mts.; it shows both flowers and fruit.
Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6582.*

Draba micrantha Nutt.

Draba caroliniana Walter var. *micrantha* (Nutt.) A. Gray

Infrequent in the Mixed Desert Shrub Zone. Both specimens are in mature fruit, without flowers.

S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9098;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Draba nemorosa L.

This Eurasian species occurs infrequently at mid-altitude in the Uinta Basin. Both specimens show flowers, with immature capsules also on *Graham 9256* and maturing ones on the other specimen.

Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8030;* under Aspens, Horse Creek, 7700 ft., June 18, 1935, *Graham 9256.*

Draba nitida Greene

A frequent plant of mid- and upper altitudes throughout the Basin. *Graham 7794* and *9607* are in flower; the other specimens show both flowers and maturing capsules.

Slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6649;* Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7794;* Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7976;* meadow, edge of Lodgepole Pine forest, E. of Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8180;* Willow Springs, 9550 ft., July 11, 1935, *Graham 9607.*

Draba uncinalis Rydb.

The following specimen is in the herbarium of F. J. Hermann at Ann Arbor, Michigan: above timber line, SE. slope of Mt. Emmons, 11,340 ft., July 19, 1933, *Hermann 5001* (also in Mo. Bot. Gard.).

Erysimum asperum DC. WILD WALLFLOWER

Cheiranthus asper Nutt.

Cheirinia aspera (Nutt.) Rydb.

The very variable plants forming the complex here listed under this name are common throughout the Basin at low or occasionally mid-altitudes. All of the specimens cited below show some stage of anthesis, and *Graham 6452, 7748, 8971, 8982a,* and *9233* show developing siliques as well.

5 mi. NW. of Dinosaur Quarry, 5500 ft., April 24, 1933, *Graham 7528;* 9 mi. SSE. of Vernal, 5000 ft., April 27, 1933, *Graham 7535;*

Douglass Canyon, W. of Dinosaur Quarry, 5000 ft., April 28, 1933, *Graham 7555;* 5 mi. NW. of Dinosaur Quarry, 5500 ft., May 16, 1933, *Graham 7668;* Cottonwood Springs, Little Mt., 6600 ft., May 22, 1933, *Graham 7772;* junction of Juniper and Aspen Zones, Uinta River Canyon, 7000 ft., June 2, 1933, *Graham 8059;* box canyon entering White River from N., 4 mi. NE. of mouth of Evacuation Creek, 5200 ft., May 6, 1935, *Graham 8768;* Dry Fork Creek just above Dry Fork town, 6700 ft., May 12, 1935, *Graham 8814.*

The following numbers represent atypical forms of the species, with the two Peterson specimens vaguely approaching *Cheiranthus aridus* Greene, not A. Nels.:

South of Moon Lake, 8100 ft., June 30, 1931, *Graham 6452;* E. of Willow Creek, near school house, 5300 ft., May 24, 1935, *Graham 8971;* along Willow Creek below junction of Watson road, 5300 ft., May 25, 1935, *Graham 8982a;* burned-over slope of Calamity Ridge, S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6500 ft., June 1, 1935, *Graham 9069;* Horse Creek, 7700 ft., June 18, 1935, *Graham 9233;* Ainge Gulch, 5 mi. N. of Jensen, May 29, 1912, *Peterson s. n.;* sand hills and ravines, NE. of Dinosaur Quarry, May 30, 1912, *Peterson s. n.*

The two following numbers probably represent impoverished, injured dwarfs of the species:

Orchid (Mud) Springs Canyon, W. of Dinosaur Quarry, 5000 ft., May 20, 1933, *Graham 7748;* bench W. of Green River, S. of mouth of Sand Wash, 5000 ft., May 29, 1933, *Graham 7947.*

Lepidium densiflorum var. **ramosum** (Nels.) Thell.

Common at low or occasionally mid-altitudes throughout the Basin. *Graham 7576* and *7665* show plants in very early anthesis; the other specimens show mature fruit with flowers still developing on the earlier numbers.

W. side of Green River, near Quarry "L," 4700 ft., June 18, 1931, *Graham 6079;* hills E. of Dinosaur Quarry, 5000 ft., April 29, 1933, *Graham 7576;* 3 mi. E. of Dinosaur Quarry, 5500 ft., May 15, 1933, *Graham 7665;* hills E. of Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7688;* talus slope, W. side of Green River, S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7869;* S. of Uteland Butte, 4800 ft., May 16, 1935, *Graham 8895;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham*

9093; along road, Red Creek valley, 7500 ft., June 26, 1935, *Graham 9433;* Red Bluff Wash, between White and Green Rivers, May 27, 1908, *Douglass s. n.;* hills and ravines E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Lepidium montanum var. **Eastwoodiae** (Woot.) C. L. Hitchc.

Infrequent at low altitude. *Douglass s. n.* is in flower; the other specimens show flowers and developing capsules. The specimens cited all trend toward the following variety *Jonesii.*

Canyon W. of Dragon, 5800 ft., Aug. 31, 1935, *Graham 10181;* White River bottom near Utah-Colorado state line, July 6, 1908, *Douglass s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Lepidium montanum var. **Jonesii** (Rydb.) C. L. Hitchc.

Common throughout the Basin at low altitudes of the Mixed Desert Shrub Zone. For the most part the May specimens are in flower; the later numbers largely show flowers and maturing pods. *Graham 9963* trends toward the preceding variety, and the Douglass specimen is atypical.

Flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6168;* along road S. of Vernal, 5000 ft., June 23, 1931, *Graham 6294;* bad lands N. of Skull Pass Quarry, 5000 ft., May 9, 1933, *Graham 7641;* N. of Dinosaur Quarry, 5500 ft., May 18, 1933, *Graham 7719;* near Pariette Mine, 10 mi. SE. of Myton, 5000 ft., May 26, 1933, *Graham 7859;* box canyon entering White River from N., 4 mi. NE. of mouth of Evacuation Creek, 5200 ft., May 6, 1935, *Graham 8769;* in sand, Leland Bench just N. of Pariette Creek, 5000 ft., May 13, 1935, *Graham 8822;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9101;* Florence Canyon, 4500 ft., Aug. 1, 1935, *Graham 9963;* Uinta Basin, June 9, 1912, *Peterson s. n.;* Ainge Gulch, W. of Dinosaur Quarry, June 17, 1912, *Douglass s. n.;* Uinta Basin, July 13, 1912, *Peterson s. n.*

Lepidium montanum var. **typicum** C. L. Hitchc.

Infrequent at low altitudes. Both specimens show flowers and developing capsules. There is also a specimen (*Peterson s. n.*) of *Lepidium montanum* collected NE. of the Dinosaur Quarry, May 30, 1912, which is unidentifiable as to variety.

Talus slope, W. side of Green River, S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7886;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 10014.*

Lesquerella condensata var. **laevis** Payson See Ann. Mo. Bot. Garden 8: 212. 1921.

A frequent plant of rocky situations throughout the Basin in the Mixed Desert Shrub Zone. All of the specimens show flowers with some developing pods; they are atypical and may represent a distinct variety. The specimens represent a southward extension of range as the variety *laevis* was known previously only from Wyoming and Montana.

Asphalt Ridge, S. of Lapoint road, 6000 ft., May 25, 1933, *Graham 7833;* bench, head of Sand Wash, 5300 ft., May 26, 1933, *Graham 7866;* W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7907;* N.-facing edge of Diamond Mt. plateau, 6500 ft., June 5, 1933, *Graham 8080;* shale knoll along Watson-Ouray road 5 mi. W. of Bitter Creek, 6300 ft., May 26, 1935, *Graham 8990.*

Lesquerella ludoviciana (Nutt.) Wats.

Lesquerella argentea (Pursh) MacMillan

A frequent plant of low and mid-altitude dry places. All of the specimens show flowers, with those of May 29 exhibiting maturing capsules also.

Hills E. of Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7705;* junction of Juniper and Aspen Zones, Uinta River Canyon, 7000 ft., June 2, 1933, *Graham 8060;* Ainge Gulch, 5 mi. N. of Jensen, May 29, 1912, *Peterson s. n.;* hills and ravines E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* hills and ravines NE. of Dinosaur Quarry, May 30, 1912, *Peterson s. n.*

Lesquerella utahensis Rydb.

The single flowering specimen of this Utah endemic cited was collected in the Lodgepole Pine Zone of the Uinta Mts.

Meadow, edge of Lodgepole Pine forest, E. of Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8194.*

Nasturtium obtusum var. **alpinum** Wats.

Frequent in the Spruce-Fir Zone of the Uinta Mts. *Graham 6578* is an immature specimen; the other numbers show both flowers and developing siliques.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6578;* on earthwork of dam, Paradise Park reservoir, 10,000 ft., July 4, 1933, *Graham*

8363; meadow along stream above Chain Lakes, SE. slope of Mt. Emmons, 11,000 ft., July 20, 1933, *Graham 8552.*

Nasturtium officinale Br. WATER CRESS

Radicula Nasturtium-aquaticum (L.) Britten and Rendle
Roripa Nasturtium Rusby
Sisymbrium Nasturtium-aquaticum L.

This European introduction is found as an occasional plant in wet places of low and mid-altitudes. *Graham 6408* shows flowers and mature siliques; the other specimens exhibit flowers and young capsules.

Dry Fork, in Juniper Zone, 7000 ft., June 27, 1931, *Graham 6408;* along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7429;* marsh, mouth of Ashley Creek, 4750 ft., May 30, 1935, *Graham 9010.*

Nasturtium palustre (L.) DC.

Radicula terrestris (R. Br.) Woot. and Standl.
Roripa palustris Besser

The single specimen of this European species cited was collected in the lower Spruce-Fir Zone of the Uinta Mts.; it is in mature fruit.

Along Island Lake shore, NE. of Paradise Park, 10,200 ft., Aug. 16, 1935, *Graham 10033.*

Nasturtium palustre var. **hispidum** (Desv.) Gray

The single specimen cited was collected in Aspen woods on the southernmost part of the Tavaputs Plateau; it is in flower with maturing fruit.

Post Canyon, 7800 ft., July 28, 1935, *Graham 9889.*

Nasturtium sinuatum Nutt.

Radicula sinuata (Nutt.) Greene
Roripa sinuata Hitchc.

The single specimen cited shows flowers and mature fruit.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6113.*

There is also a specimen (*Graham 9644*) in the above genus, too immature for exact determination, collected at the head of the West Fork of Douglas Creek, Colo., which seems to represent a form of *Nasturtium curvisiliquum* (Hook.) Nutt.

Parrya platycarpa Rydb.

This Uinta Mountain endemic was collected only at Mt. Emmons in the Alpine Zone of the Uinta Mts. It occurs on both slopes of the range and so is not confined to the Basin proper. *Graham 8469* shows some old flowers and young pods; the other specimen exhibits mature capsules only.

E. slope of Mt. Emmons, 12,000 ft., July 18, 1933, *Graham 8469;* SE. slope of Mt. Emmons, 12,000 ft., July 20, 1933, *Graham 8469a.*

Physaria didymocarpa (Hook.) A. Gray

Collected only near the Dinosaur Quarry in the upper Mixed Desert Shrub Zone. *Graham 7714* is in flower; the other specimen shows both flowers and mature capsules. Both specimens represent a coarse form of the species.

N. of Dinosaur Quarry, 5500 ft., May 18, 1933, *Graham 7714;* Ainge Gulch, W. of Dinosaur Quarry, June 17, 1912, *Douglass s. n.*

Physaria didymocarpa var. **australis** Payson

Common throughout the Basin at low and occasionally mid-altitudes. *Graham 6342, 8171, 9753, Douglass s. n.,* and *Peterson s. n.* (July 4) exhibit mature capsules; the remaining specimens show flowers with developing capsules on some of the later numbers.

Davis Hollow, Taylor Mt., 8500 (?) ft., June 24, 1931, *Graham 6342;* 5 mi. NW. of Dinosaur Quarry, 5500 ft., April 25, 1933, *Graham 7526;* Cottonwood Springs, Little Mt., 6600 ft., May 22, 1933, *Graham 7786;* Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8018;* Vernal-Manila road N. of Vernal, 6500 ft., June 19, 1933, *Graham 8171;* box canyon entering White River from N., 4 mi. NE. of mouth of Evacuation Creek, 5200 ft., May 6, 1935, *Graham 8766;* E. side of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8947;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6500 ft., June 1, 1935, *Graham 9062;* upper middle fork of Stuart Creek, Colo., 7500 ft., July 18, 1935, *Graham 9753;* Ainge Gulch W. of Dinosaur Quarry, June 17, 1912, *Douglass s. n.;* Uinta Basin, July 4, 1912, *Peterson s. n.;* Uinta Basin, July 13, 1912, *Peterson s. n.*

Physaria Grahami C. V. Morton, sp. nov.

Herba caespitosa, usque ad 15 cm. alta; caules breves, paucifoliati; folia basalia numerosa, ca. 15 cm. longa, lamina ambitu variabili,

plus minusve oblanceolata vel spathulata, saepissime irregulariter pinnatifida, segmento terminali nunc subflabelliformi, rotundato, subtriloba, usque ad 5 cm. lato, nunc acuta et sinuato-quinquelobato, segmentis lateralibus paucis vel interdum nullis, deltoideis vel lanceolatis, in petiolo longe decurrente, ubique stellato-tomentosa; folia caulina sinuato-angulata; inflorescentia subcorymbosa, pedicellis ca. 6 mm. longis, demum usque ad 2 cm. longis; sepala lanceolata, 5 mm. longa, externe dense stellato-pubescentia, intus glabra; petala flava, oblanceolata, ca. 6.5 mm. longa, lamina 2.5-3 mm. lata, glabra, ungui longo, angusto; antherae sagittatae; ovarium albo-tomentosum; silicula erecta, didyma, valde inflata, utrinque cordata, 9 mm. longa, 10 mm. lata, dense stellato-tomentosa, stylo persistente 7 mm. longo coronata, valvis subsphaeroideis, haud angulatis vel appendiculatis.

Chandler Canyon, 6000 ft., Aug. 3, 1935, *Graham 9976*, TYPE, in the U. S. National Herbarium, No. 1,653,849, cotypes in the Carnegie Museum Herbarium.

Although similar in flowers and fruits to other members of the genus, such as *P. didymocarpa* and *P. floribunda*, the present species is amply distinguished by its very peculiar leaves. These, the largest known in the genus, are exceedingly variable in shape, but two principal types may be recognized. In one type the terminal portion of the blade is fan-shaped, broader than long, broadly rounded at the summit, and with a divergent lobe at either side. This terminal segment narrows abruptly at base and the lamina then tapers imperceptibly into the petiole. A single pair of teeth is often borne farther down the blade. In the second type, which is connected with the first by intermediates, the terminal segment is acute, and usually sinuately five-toothed or pinnately lobed at base and often bears several pairs of lanceolate lobes farther down the blade. In *Physaria floribunda*, the species most closely related to *P. Grahami*, the stem leaves are entire, and the lower leaves much smaller and differently shaped. Also they are often entire, which is never true in *P. Grahami*, and in the occasional pinnatifid leaves the terminal lobe is entire and not broader than long.

Sinapis arvensis L. CHARLOCK

Brassica arvensis (L.) Rabenh.

This European introduction was collected only at the locality cited. The specimen is in flower with developing siliques.

Along road, N. side of Strawberry River, 5 mi. below mouth of Red Creek, 6100 ft., June 19, 1935, *Graham 9274.*

Sisymbrium altissimum L. TUMBLE MUSTARD

Norta altissima (L.) Britton

This European species is found throughout the Basin at low altitudes. *Graham 9085* is in flower; the other specimens show a few flowers and developing siliques.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6273;* Dry Fork, in Juniper Zone, 7000 ft., June 26, 1931, *Graham 6386;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9085.*

Sisymbrium linifolium Nutt.

Schoenocrambe linifolia (Nutt.) Greene

Common at low altitudes throughout the Basin; *Graham 7590* shows flowers only; all of the other specimens show flowers and varying stages of developing siliques except *Douglass s. n.*, which exhibits matured siliques only.

Dry Fork, in Juniper Zone, 7000 ft., June 26, 1931, *Graham 6392;* sand hills out Maeser road, 6000 ft., May 2, 1933, *Graham 7590;* 3 mi. E. of Dinosaur Quarry, 5500 ft., May 15, 1933, *Graham 7663;* Cottonwood Springs, Little Mt., 6600 ft., May 22, 1933, *Graham 7777;* near Pariette Mine, 10 mi. SE. of Myton, 5000 ft., May 26, 1933, *Graham 7846;* talus slope, W. side of Green River, S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7875;* box canyon entering White River from N., 4 mi. NE. of mouth of Evacuation Creek, 5200 ft., May 6, 1935, *Graham 8767;* edge of alfalfa field near Myton, 5500 ft., May 13, 1935, *Graham 8838;* Dry Run, Red Bluff Wash, Dragon-Vernal road between White and Green Rivers, June 27, 1908, *Douglass s. n.*

Smelowskia linearilobа Rydb.

Common among rocks of the Alpine Zone in the Uinta Mts. The specimens all show flowers with very young capsules except *Graham 8567* and *10125* which bear mature siliques. O. E. Schulz (Das Pflanzenreich IV. 105, Heft 86, p. 357. 1924) considers this species to be synonymous with *S. americana* Rydb. and *S. calycina* A. Gray, but to be distinct from the central Asiatic *S. calycina* (Stephan) C. A. Mey. (loc. cit. p. 355).

Slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6640*, *Graham 6647;* ridge NNW. of Paradise Park, 11,000 ft., July 8, 1933, *Graham 8433;* E. slope of Mt. Emmons, 12,000 ft., July 18, 1933, *Graham 8471;* near top of Mt. Emmons, 13,000 ft., July 18, 1933, *Graham 8473;* SE. slope of Mt. Emmons, meadow above trees, 11,400 ft., July 20, 1933, *Graham 8567;* head of West Fork of Whiterocks River, 12,000 ft., Aug. 21, 1935, *Graham 10125*.

Stanleya arcuata Rydb.

Common throughout the Basin at low altitudes. All of the specimens are in flower, with *Graham 9517* showing mature siliques as well.

Along road S. of Vernal, 5000 ft., June 23, 1931, *Graham 6291;* bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7914;* N. side of Strawberry River, 10 mi. W. of Duchesne, 5800 ft., June 19, 1935, *Graham 9272;* head of divide between Wells Draw and tributary of Minnie Maud Creek, 30 mi. from Myton, 7100 ft., July 5, 1935, *Graham 9498;* Cottonwood Creek, 6900 ft., July 6, 1935, *Graham 9517;* Ainge Gulch, W. of Dinosaur Quarry, June 17, 1912, *Douglass s. n.*

Stanleyella Wrightii (Gray) Rydb.

Thelypodium Wrightii Gray

The single specimen cited, which shows flowers and maturing siliques, was collected on the southernmost extension of the Tavaputs Plateau.

Post Canyon, 8000 ft., July 29, 1935, *Graham 9922*.

Streptanthella longirostris (Wats.) Rydb.

Arabis longirostris Wats.

Streptanthus longirostris Gray

Frequent at low altitudes of the central part of the Basin. All of the specimens are in flower except *Peterson s. n.*, which shows matured siliques only, and *Graham 8867* which shows both flowers and developing capsules.

Flat S. of Skull Pass Quarry, 5000 ft., May 7, 1933, *Graham 7623;* bad lands N. of Skull Pass Quarry, 5000 ft., May 9, 1933, *Graham 7640;* rocky slope, W. side of Duchesne River, 4 mi. above Ouray, 4800 ft., May 15, 1935, *Graham 8867;* in sand, W. of Green River just S. of Uteland Butte, 4800 ft., May 16, 1935, *Graham 8880;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Streptanthus cordatus Nutt.

Cartiera cordata (Nutt.) Greene

Infrequent on rocky, low altitude bluffs throughout the Basin. All of the specimens show flowers, with *Graham 9101b* exhibiting mature siliques as well.

Rocky slope, W. side of Duchesne River, 4 mi. above Ouray, 4800 ft., May 15, 1935, *Graham 8874;* E. of Willow Creek, near Thorne's ranch, 5800 ft., May 22, 1935, *Graham 8927;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6500 ft., June 1, 1935, *Graham 9061;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9101b.*

Thelypodiopsis wyomingensis (Nels.) Rydb.

Streptanthus wyomingensis Nels.

Common throughout the Basin in dry situations of low altitude. All of the specimens are in flower, with most of the mid- and late May numbers showing well-developed siliques as well.

5 mi. NW. of Dinosaur Quarry, 5500 ft., April 24, 1933, *Graham 7514;* 5 mi. NW. of Dinosaur Quarry, 5500 ft., April 25, 1933, *Graham 7524;* hills E. of Dinosaur Quarry, 5000 ft., April 29, 1933, *Graham 7562;* bad lands N. of Skull Pass Quarry, 5000 ft., May 9, 1933, *Graham 7632;* hills E. of Dinosaur Quarry, 5500 ft., May 16, 1933, *Graham 7699;* near Pariette Mine, 10 mi. SE. of Myton, 5000 ft., May 26, 1933, *Graham 7852;* bench W. of Green River, S. of mouth of Sand Wash, 5000 ft., May 29, 1933, *Graham 7943;* box canyon entering White River from N., 4 mi. NE. of mouth of Evacuation Creek, 5200 ft., May 6, 1935, *Graham 8764;* sandy canyon bottom, N. side of White River, 4 mi. NE. of mouth of Evacuation Creek, 5200 ft., May 7, 1935, *Graham 8772;* Leland Bench, just N. of Pariette Creek, 5000 ft., May 13, 1935, *Graham 8830;* S. edge of Leland Bench, just N. of Pariette Creek, 5000 ft., May 14, 1935, *Graham 8841a;* W. of Willow Creek, Thorne's ranch, 5400 ft., May 23, 1935, *Graham 8964;* E. of Willow Creek, near school house, 5300 ft., May 24, 1935, *Graham 8976.*

Thelypodium suffrutescens Reed C. Rollins, sp. nov.

Perenne, glabrum et glaucum; caulibus erectis gracilibus simplicibus 1-3 dm. altis, basi suffruticosis; foliis caulinis oblanceolatis integris 1-2.5 cm. longis, 0.5-1 cm. latis; inflorescentiis racemosis 4-10 cm. longis; sepalis oblongis non saccatis 4-6 mm. longis; petalis flavis

spathulatis 9-11 mm. longis, 3 mm. latis; pedicellis erectis rigidis 3-12 mm. longis; siliquis maturis ignotis; stigmate integro; seminibus exalatis.

Perennial, glabrous and glaucous throughout; stems numerous from a lignescent branching caudex, erect, slender, simple and leafy to the inflorescence, 1-3 dm. high, probably taller in fruit; basal leaves early deciduous or absent; cauline leaves numerous and approximate, entire, nearly oblanceolate but tapering rather abruptly on the distal portion, sessile or the lower short-petiolate, 1-2.5 cm. long, 0.5-1 cm. broad; inflorescence narrowly racemose, ebracteate or with few leaf-like bracts subtending the lower flowers, 4-10 cm. long; sepals oblong, not saccate, yellowish at anthesis but becoming green and foliaceous at fruiting, 4-6 mm. long, 1-2 mm. broad; petals yellow, spatulate, slightly dilated at base, 9-11 mm. long, 3 mm. broad; filaments dilated at base, those of the long stamens usually united below; pedicels rigidly erect, elongating in fruit, 3-12 mm. long; immature pods sessile, erect, slightly flattened, 1 cm. long; stigma entire or slightly lobed over the valves; seeds wingless.

W. of Willow Creek, Thorne's ranch, eastern slope of Big Pack Mountain, 5 miles north of mouth of Agency Draw, 5400 ft., May 23, 1935, *Graham 8959*, TYPE, in Gray Herb., cotypes in Carn. Mus. Herb.

The generic position of this species is not certainly determinable without mature fruiting specimens. The nearest relative is probably *Thelypodium elegans* Jones (*Thelypodiopsis elegans* Rydb., *Sisymbrium elegans* Payson); however, the relationship is not close. *T. suffrutescens* is distinct from any described species in *Thelypodium*, *Thelypodiopsis* or *Sisymbrium*. A full consideration of these genera in light of varying treatments by recent authors has been taken into account. The lignescent multiple caudex, oblanceolate entire leaves and narrowly racemose inflorescence are characteristics peculiar to the species here described.

Thlaspi glaucum A. Nels.

Frequent in mid- and upper altitude forests and river canyons. All of the specimens show flowers and developing capsules.

Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7804;* Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8029;* meadow, Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8197*.

CRASSULACEAE

Clementsia rhodantha (A. Gray) Rose RED ORPINE

Sedum rhodanthum A. Gray

Infrequent in the Uinta Mts. where it occurs in wet meadows or along the borders of streams and lakes in the Spruce-Fir and Alpine Zones. The specimens all bear flowers, with maturing capsules of the present season on *Graham 10047* and *10230*, and old capsules of the preceding season also on the latter number and on *Graham 8464*.

SE. slope of Mt. Emmons, 11,600 ft., July 18, 1933, *Graham 8464;* Paradise Park, 10,000 ft., Aug. 16, 1935, *Graham 10047;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10230;* Petty Mt., 15 mi. N. of Mountain Home, 10,000 ft., Aug. 22, 1936, *Doutt 4349*.

Sedum stenopetalum Pursh STONE CROP, ORPINE

Sedum subalpinum Blankenship

Common in the Uinta Mts. at mid- and upper altitudes where it occurs in rocky, open situations. The specimens all show flowers and capsules in various stages of maturity.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6327;* W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6486;* up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6520;* Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7809;* Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8034;* Vernal-Manila road N. of Vernal, 6500 ft., June 19, 1933, *Graham 8160;* between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 19, 1933, *Graham 8483;* 10 mi. S. of Moon Lake, E. side of W. Fork above mouth of E. Fork (Yellowstone) Creek, 6900 ft., June 22, 1935, *Graham 9293;* Chepeta Lake, 10,600 ft., Aug. 21, 1935, *Graham 10108;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.;* Yellowstone (East Fork of Lake Fork) Creek, 12 mi. N. of Mountain Home, 7800 ft., Aug. 18, 1936, *Doutt 4341;* Petty Mt., 15 mi. N. of Mountain Home, 10,000 ft., Aug. 22, 1936, *Doutt 4350*.

SAXIFRAGACEAE

Heuchera parvifolia var. **major** Rosend. Butt. and Lak. See Minn. Studies in Plant Sci. **2**: 164. 1936.

The single specimen cited is in flower.

Middle Fork of Stuart Creek, Colo., 7500 ft., July 18, 1935, *Graham 9737*.

Heuchera parvifolia Nutt. apud Torr. and Gray var. **microcarpa** Rosend. Butt. and Lak. See Minn. Studies in Plant Sci. **2**: 165. 1936.

The single specimen cited possesses fruit so immature that determination is not certain; if actually this variety its range would be extended somewhat to the northwest.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6355*.

Heuchera parvifolia Nutt. var. **utahensis** (Rydb.) Garrett See Spring Flora, Wasatch Region 39. 1911.

Heuchera utahensis Rydb.

Frequent at mid-altitudes throughout the Basin. *Graham 9283* is in fruit; the other specimens are in flower.

Near Little Lake, 8300 ft., June 23, 1933, *Graham 8267;* burned-over Calamity ridge, S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6500 ft., June 1, 1935, *Graham 9056;* on N.-facing slope of E. side canyon 3 mi. above mouth of Red Creek, 6300 ft., June 19, 1935, *Graham 9283*.

Lithophragma bulbifera Rydb. STAR or PRAIRIE FLOWER, WOODLAND STAR

Infrequent in the Uinta Mts. and west end of the Basin, all of the specimens cited having been collected in Aspen woodland. *Graham 8232* shows immature fruit only; the other specimens are in flower, with *9251* showing immature fruit also.

Uinta River Canyon, 7500 ft., June 2, 1933, *Graham 8064;* Pot Creek road, NE. of Little Brush Creek Knob, 8000 ft., June 7, 1933, *Graham 8121;* near Little Lake, 8500 ft., June 22, 1933, *Graham 8232;* Horse Creek, 7700 ft., June 18, 1935, *Graham 9251*.

Lithophragma parviflora (Hook.) Nutt.

The single flowering specimen cited was collected in the extreme west end of the Basin under Aspens.

Head of Horse Creek, 7800 ft., June 17, 1935, *Graham 9224*.

Micranthes arguta (D. Don) Small

Saxifraga arguta D. Don
Saxifraga denudata Nutt.
Saxifraga punctata Auth.

Infrequent throughout the Basin in wet situations of mid- and upper altitude forests. Both specimens bear maturing fruit and flowers.

West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9683;* Lodgepole-Spruce forest between Paradise Park and Chepeta Lake, 10,300 ft., Aug. 20, 1935, *Graham 10088.*

Mitella pentandra Hook.

Pectianthia pentandra (Hook.) Rydb.

The single flowering specimen cited was collected in the Spruce-Fir Zone of the Uinta Mts.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6603.*

Mitella stenopetala Piper

Ozomelis stenopetala (Piper) Rydb.

Infrequent in mid- and upper altitudes of the Uinta Mts. *Graham 9236* is in flower; *Graham 10225* is an over-mature specimen but seems logically assigned to this species from vegetative characters.

Horse Creek, 7700 ft., June 18, 1935, *Graham 9236;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10225.*

Philadelphus microphyllus A. Gray

Infrequent, and collected only along lower Dry Fork Creek on the south slope of the Uinta Mts., in rocky places of the Juniper-Pinyon Zone. The June specimen is in flower; the September specimens show mature fruit.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6270;* Dry Fork, in Juniper Zone, 7000 ft., Sept. 5, 1931, *Graham 7450, Graham 7454.*

Philadelphus occidentalis A. Nels.

Frequent throughout the Basin in rocky situations of the upper Juniper-Pinyon and Sub-montane Shrub Zones. In the latter zone it often forms an important secondary species. It was also collected (*Graham 8091*) on the north slope of the Uinta Mts. in Jackson Draw. The specimens show it flowering in July and maturing fruit in August.

Dry Fork in Juniper Zone, 7000 ft., June 26, 1931, *Graham 6397;* Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9145;* Cottonwood Canyon, 5700 ft., July 7, 1935, *Graham 9520;* Post Canyon, 8000 ft., July 29, 1935, *Graham 9916;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 10015.*

Ribes aureum Pursh FLOWERING, MISSOURI, GOLDEN, or
Chrysobotrya aurea (Pursh) Rydb. BUFFALO CURRANT
Chrysobotrya Lindleyana and *Chrysobotrya intermedia* Spach

Common in moist shaded places and desert canyons of low altitude throughout the Basin. All the specimens are flowering except *Graham 8966, 9513*, and *Peterson s. n.*, which show maturing fruit. It was also collected (*Graham 8098*) on the north slope of the Uintas in Jackson Draw. The fruit is much used in making pies.

3 mi. W. of Dinosaur Quarry, 5500 ft., May 15, 1933, *Graham 7651;* spring along road, Brush Creek W. of Dinosaur Quarry, 5000 ft., May 16, 1933, *Graham 7681;* Cottonwood Springs, Little Mt., 6600 ft., May 22, 1933, *Graham 7775;* box canyon, entering White River from N., 4 mi. NE. of mouth of Evacuation Creek, 5200 ft., May 6, 1935, *Graham 8763;* Dry Fork Creek near Dry Fork town, 6500 ft., May 12, 1935, *Graham 8809;* W. of Willow Creek, Thorne's ranch, 5300 ft., May 23, 1935, *Graham 8966;* Cottonwood Creek, 6500 ft., July 6, 1935, *Graham 9513;* White River, June 28, 1912, *Peterson s. n.*

Ribes inebrians Lindl.
Ribes pumilum Nutt.

Frequent throughout the Basin in woodlands of mid- and upper altitudes. It was also collected (*Graham 8088*) on the north slope of the Uinta Mts. in Jackson Draw. *Graham 6664* and *9954* are vegetative specimens; *Graham 9994* shows fruit; the other numbers bear flowers.

Slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6664;* Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7971;* NNW. of Paradise Park, 11,000 ft., July 8, 1933, *Graham 8443;* ridge just below Moon Lake, 8000 ft., June 25, 1935, *Graham 9383;* head of Florence Canyon, 8000 ft., Aug. 1, 1935, *Graham 9954;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 9994.*

Ribes inerme Rydb.
Grossularia inermis (Rydb.) Cov. and Britt.

A frequent species throughout the Basin in mid- and upper altitude forests. *Graham 7972* and *9606* are in flower; the other two specimens show maturing fruit.

Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7972;* W. side of second and third Chain Lakes, 10,700 ft.,

July 22, 1933, *Graham 8593;* Rock Creek, 9200 ft., July 11, 1935, *Graham 9606;* West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9659.*

Ribes lacustre (Pers.) Poir.

Limnobotrya lacustris (Pers.) Rydb.

The single specimen cited is in flower; it was collected in Aspen woods. SW. of Moon Lake, 8100 ft., June 24, 1935, *Graham 9344.*

Ribes montigenum McClatchie

Limnobotrya montigena (McClatchie) Rydb.
Ribes lacustre molle A. Gray
Ribes lentum (M. E. Jones) Cov. and Rose

Frequent throughout the Basin in the Lodgepole Pine and Spruce-Fir Zones up to tree line. All of the specimens are in flower, except the September number which is in fruit.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6343;* Trout Creek Ranger Station, 9300 ft., June 22, 1933, *Graham 8217;* Paradise Park, 10,000 ft., July 4, 1933, *Graham 8364;* between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 20, 1933, *Graham 8557;* Rock Creek near Willow Springs, 9200 ft., July 11, 1935, *Graham 9594;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10229.*

Ribes oxyacanthoides L.

Grossularia oxyacanthoides (L.) Mill.

The single specimen cited, from the south slope of the Uinta Mts., is in fruit. Dr. Coville writes that "I have never seen *Grossularia oxyacanthoides*, which primarily ranges from Hudson Bay to Alaska, from a locality so far south."

Up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6542.*

Ribes setosum Lindl.

Grossularia setosa (Lindl.) Cov. and Britt.
Ribes saximontanum E. Nels.

The single specimen cited shows immature fruit. Dr. Coville writes that "I have never before seen [this species] from Utah." The range of the species would therefore be extended to the southwest.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6426.*

Ribes viscosissimum Pursh

Occasional in mid- or upper altitude woodlands; the specimens cited are in flower.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6444;* WNW. of Trout Creek Ranger Station, 9500 ft., June 21, 1933, *Graham 8209.*

Ribes Wolfii Rothrock

The single fruiting specimen cited was collected on the southeastern Basin rim.

One mi. W. of Baxter Pass, Colo., 8300 ft., Aug. 29, 1935, *Graham 10158.*

Saxifraga debilis Engelm.

Saxifraga rivularis L.

A frequent species of moist rocky situations in the Lodgepole Pine and Spruce-Fir Zones of the Uinta Mts. The specimens show varying stages of anthesis and young fruit.

Slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6631, Graham 6658;* Blanchard Park, head of Dry Fork Creek, 10,000 ft., July 5, 1933, *Graham 8389;* W. side of second and third Chain Lakes, 10,700 ft., July 22, 1933, *Graham 8606.*

Saxifraga rhomboidea Greene

Micranthes rhomboidea (Greene) Small

An infrequent species of rocky meadows in the uppermost forested zones of the Uinta Mts. The specimens are in flower.

Slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6648;* Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8203;* Petty Mt., 15 mi. N. of Mountain Home, 10,000 ft., Aug. 22, 1936, *Doutt 4345.*

ROSACEAE

Amelanchier florida Lindl.

The specimens cited are from mid-altitudes in the west end of the Basin. Specimens were also collected in Jackson Draw (*Graham 8093*) on the north slope of the Uinta Mts. and in Daniel's Canyon (*Graham 9214*) on the west slope of the Basin, where the species is very common. The June specimen is in flower; the July numbers are in fruit.

W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6496;* up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6534;* Horse Creek, 7700 ft., June 18, 1935, *Graham 9262.*

Amelanchier pallida Greene

Amelanchier oreophila A. Nels.

Frequent at low or mid-altitudes throughout the Basin. *Graham 8074* and *9407* show flowers with young fruit; the other specimens exhibit maturing fruit. A specimen (*Graham 9632*) was also collected in Water Canyon on the south slope of the Book Cliffs.

Near spring, S. slope of Diamond Mt., 6000 ft., June 5, 1933, *Graham 8074;* E. side of Green River near Island Park, 5000 ft., June 11, 1935, *Graham 9202;* N.-facing slope of E. side canyon, 3 mi. above mouth of Red Creek, 6300 ft., June 19, 1935, *Graham 9284;* Aspen-filled valley entering Red Creek from the east, 7500 ft., June 26, 1935, *Graham 9407;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9896.*

Amelanchier prunifolia Greene

Common throughout the Basin at low or occasionally mid-altitudes. The May and early June specimens are in flower; the later numbers show developing fruits.

3 mi. E. of Dinosaur Quarry, 5500 ft., May 15, 1933, *Graham 7659;* W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7902;* Uinta River Canyon, 7200 ft., June 2, 1933, *Graham 8061;* rocky outcrop, desert 9 mi. SSE. of Vernal, 5000 ft., May 2, 1935, *Graham 8749;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6700 ft., June 1, 1935, *Graham 9074;* head of Deep Channel Creek, Colo., 6400 ft., June 4, 1935, *Graham 9123;* E. side of Green River, near Island Park, 5000 ft., June 11, 1935, *Graham 9196;* west side of Rock Creek, along Mountain Home-Tabiona road, 7500 ft., June 25, 1935, *Graham 9363;* Cottonwood Canyon, 6000 ft., July 6, 1935, *Graham 9519;* Ainge Gulch, 5 mi. N. of Jensen, May 29, 1912, *Peterson s. n.*

Amelanchier pumila Nutt.

The single flowering specimen cited was collected on the southernmost extension of the Tavaputs Plateau.

East slope of Range Creek near Willow Springs, 9600 ft., July 12, 1935, *Graham 9619.*

Amelanchier utahensis Koehne

Frequent throughout the Basin at low altitudes. The May specimens are in flower; the June number is in fruit.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6289;* hills E. of Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7706;* along Dry Fork Creek just below Dry Fork town, 6500 ft., May 12, 1935, *Graham 8810;* Rainbow, 3 mi. S. of Watson, 6000 ft., May 27, 1935, *Graham 9006.*

Cercocarpus arizonicus M. E. Jones MOUNTAIN MAHOGANY

Collected only in canyons at low altitude at the base of the Uinta Mts. Both specimens are vegetative but the August number has detached, fallen seeds with it.

Sand hills out Maeser road, 6000 ft., May 2, 1933, *Graham 7588;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 9993.*

Cercocarpus intricatus S. Wats.

The single fruiting specimen cited was collected on rocks among Junipers on the south slope of the Uinta Mts.

Dry Fork, in Juniper Zone, 7000 ft., June 26, 1931, *Graham 6393.*

Cercocarpus ledifolius Nutt.

Scarce in the Basin, it is one of those shrubby species which, like forms of Quercus, is much more abundant on the Basin's outer slopes than within its confines. It is common in Daniel's Canyon on the west slope of the Basin, and abundant on the south slopes of the Book Cliffs where it (*Graham 9634*) was collected in Water Canyon. The June specimen is in flower; the July number shows fruit.

Low ridge just below Moon Lake, 8000 ft., June 25, 1935, *Graham 9385;* ridge between Florence and head of Post Canyons, 8200 ft., July 29, 1935, *Graham 9911.*

Cercocarpus montanus Raf.

Cercocarpus parvifolius Nutt.

Common at low and mid-altitudes throughout the Basin. It occurs in low altitude canyons and is also an important secondary species in the Sub-montane Shrub Zone, where it seems often to prefer shale

outcrops. The specimens show the species flowering in late May and June and maturing fruit from July to September.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6382a;* Dry Fork, in Juniper Zone, 7000 ft., June 26, 1931, *Graham 6398;* Dry Fork, in Juniper Zone, 7000 ft., Sept. 5, 1931, *Graham 7461;* W. of Willow Creek, Thorne's ranch, 5400 ft., May 23, 1935, *Graham 8967;* head of Deep Channel Creek, Colo., 6400 ft., June 4, 1935, *Graham 9120;* W. base of Blue Mt., E. side of Green River, Island Park, 5300 ft., June 11, 1935, *Graham 9199;* low ridge just below Moon Lake, 8000 ft., June 25, 1935, *Graham 9387*, *Graham 9389;* middle fork of Stuart Creek, Colo., 7500 ft., July 18, 1935, *Graham 9762;* one mi. W. of Baxter Pass, Colo., 8300 ft., Aug. 29, 1935, *Graham 10151;* NE. of Dinosaur Quarry, May 30, 1912, *Peterson s. n.*

Cowania Stansburiana Torr.

Cowania mexicana A. Gray, not D. Don

The single flowering specimen cited was collected along the rocky slope of Desolation Canyon.

Along Green River in Desolation Canyon between Florence and Chandler Canyons, 4500 ft., Aug. 2, 1935, *Graham 9969.*

Crataegus erythropoda Ashe

Crataegus cerronis A. Nels.

The single flowering specimen cited was collected in the east end of the Basin. The species has been reported in manuals only from Wyoming, and therefore this seems to be the first report of it from Colorado.

S. side of White River along road 4 mi. below mouth of Piceance Creek, Colo., 5700 ft., June 3, 1935, *Graham 9106.*

Crataegus rivularis Nutt.

Crataegus tennowana A. Nels., a form with short spines

Crataegus Wheeleri Rydb., not A. Nels.

Scarce but widely distributed throughout the Basin along streams of low and mid-altitudes. *Graham 9108* and *9448* are in flower; the remaining specimens show varying stages of maturing fruit.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6235*, *Graham 6240;* Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7383;* S. side of White River along road 4 mi. below mouth of Piceance Creek, Colo., 5700 ft., June 3,

1935, *Graham 9108;* W. side of Red Creek, 7500 ft., June 27, 1935, *Graham 9448;* Bitter Creek, 3 mi. E. of Utah-Colorado state line, 7800 ft., Aug. 30, 1935, *Graham 10170;* Duchesne River at mouth of West Fork, 7500 ft., Sept. 8, 1935, *Graham 10252.*

Dasiphora fruticosa (L.) Rydb. SHRUBBY CINQUEFOIL,
Potentilla fruticosa L. YELLOW ROSE, "TAMARACK"

This circum-boreal species is common in the upper altitudes of the Uinta Mts. where it grows along cold meadow streams or among rocks of the Lodgepole Pine and Spruce-Fir Zones, as well as at higher elevations, often reaching above the tree line in sheltered situations. *Graham 8455* is in bud; *Graham 8188* shows old fruit of the preceding season; the remaining specimens are in flower.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6568;* Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8188;* SW. slope of Marsh Peak, 11,000 ft., July 10, 1933, *Graham 8455;* between E. ridge of Mt. Emmons and Chain Lakes, 11,300 ft., July 20, 1933, *Graham 8520;* SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9319;* Paradise Park, 10,000 ft., Aug. 16, 1935, *Graham 10054.*

Dryas octopetala L. DRYAD, MOUNTAIN AVENS

This arctic-alpine Eurasian species was collected and observed only at the locality cited in the high Uinta Mts. where it was growing on the exposed rocky shore of a small glacial lake in typically arctic-alpine conditions. The specimen shows both flowers and fruit.

E. slope of Mt. Emmons, 11,500 ft., July 18, 1933, *Graham 8458.*

Drymocallis convallaria Rydb.

Infrequent at mid-altitudes in the Uinta Mts. Both specimens are in flower.

W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6478;* W. side of Red Creek, 7500 ft., June 27, 1935, *Graham 9451.*

Drymocallis glandulosa (Lindl.) Rydb.

Pole Creek Basin, 7500 ft., June 11, 1926, *Woods and Walkup 31,* USFS 54269.

Fragaria glauca (S. Wats.) Rydb. STRAWBERRY
Fragaria virginiana (?) *glauca* S. Wats.

Common throughout upper altitude woodland meadows of the Uinta Mts. and occasionally lower in the larger canyons.

No attempt is here made to separate this species into its several segregates. The specimens are somewhat glaucous, the leaves in several tend to be cuneate oblong and the scapes of all are few-flowered. *Graham 6622*, *8377* and *8505a* are dwarf plants, perhaps due to the altitude at which they were collected. *Graham 8505a* is in fruit; the others all show flowers.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6467;* Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6610*, *Graham 6622;* Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7988;* Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8177;* near Little Lake, 8300 ft., June 23, 1933, *Graham 8239;* small lake E. of Paradise Park, 10,000 ft., July 4, 1933, *Graham 8377;* E. slope of Mt. Emmons, 11,300 ft., July 19, 1933, *Graham 8505*, *Graham 8505a;* Horse Creek, 7700 ft., June 18, 1935, *Graham 9245*.

Geum macrophyllum Willd.

Frequent throughout the Basin in moist shaded places along streams of mid-altitude, or occasionally higher. *Graham 9652* and *9866* are in fruit; *Graham 6532* and *9454* show flowers and maturing fruit; the remaining numbers are in flower.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6423;* up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6532;* E. tributary of Red Creek, 7500 ft., June 26, 1935, *Graham 9393;* W. side of Red Creek, 7500 ft., June 27, 1935, *Graham 9454;* Willow Springs, 9550 ft., July 10, 1935, *Graham 9533;* West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9652;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9866*.

Holodiscus dumosus (Nutt.) Heller — OCEAN or MOUNTAIN SPRAY, ROCK SPIRAEA
Sericotheca dumosa (Nutt.) Rydb.
Sericotheca microphylla Rydb.
Spiraea dumosa Nutt.

Infrequent but widely distributed throughout the Basin at mid- or upper altitudes, especially in rocky canyons. All of the specimens are in flower, and all have the small leaves, but not the small inflorescence, of Rydberg's *Sericotheca microphylla*, a segregate which is not here considered distinct. It was also collected (*Graham 8092*) in Jackson Draw on the north slope of the Uinta Mts., and (*Graham 9707*) in East Salt Creek on the south slope of the Book Cliffs.

Pass between Minnie Maud and Soldier Creeks, 7200 ft., July 8,

1935, *Graham 9530;* near head of Florence Canyon, 8000 ft., Aug. 1, 1935, *Graham 9952;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 9998;* rocky bluff of E. summit of Whiterocks Canyon, between Red Pine and Paradise Creeks, 10,000 ft., Aug. 17, 1935, *Graham 10067;* north of White River, 5 mi. above Dragon-Vernal stage road, June 25, 1908, *Douglass s. n.*; White River, June 25, 1912, *Peterson s. n.*

Ivesia Gordonii (Hook.) T. and G.

Horkelia Gordonii Hook.

At head, East Fork Uinta, 9500 ft., Aug. 26, 1926, *Walkup and Nord 52*, USFS 54277.

Opulaster alternans (M. E. Jones) Heller

Neillia alternans M. E. Jones

Collected only on the Tavaputs Plateau in somewhat dry situations of mid-altitude. Both specimens are in flower.

Dugway S. out of Cottonwood Creek, 6500 ft., July 6, 1935, *Graham 9514;* Basin rim near Willow Springs, 9600 ft., July 10, 1935, *Graham 9545*.

Opulaster malvaceus (Greene) Kuntze

Neillia malvacea Greene

Uinta River, Duchesne County, 7500 ft., July 2, 1928, *Weight 58*, USFS 61133.

Petrophytum caespitosum (Nutt.) Rydb.

Spiraea caespitosa Nutt.

The single flowering specimen cited was mat-like in form and collected on an exposed, rocky bluff.

Rocky bluff, E. summit of Whiterocks Canyon, between Red Pine and Paradise Creeks, 10,000 ft., Aug. 17, 1935, *Graham 10064*.

Potentilla Anserina L. SILVERWEED, GOOSE TANSY

Argentina Anserina (L.) Rydb.

An old world species collected in the Uinta Basin only along the flood-plain of the Green River, where it grows in moist depressions. The August specimen is vegetative; the others are in flower.

West side of Green River, near Quarry "L," 4700 ft., June 18, 1931, *Graham 6087;* W. side of Green River near Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7351;* near Uteland Mine, below Ouray, 4800

ft., May 17, 1935, *Graham 8903;* marsh, near mouth of Ashley Creek, 4750 ft., May 30, 1935, *Graham 9023.*

Potentilla biennis Greene

The following specimen is in the herbarium of the Missouri Botanical Garden: E. slope of fourth Chain Lake, 11,200 ft., July 21, 1933, *Hermann 5195.*

Potentilla concinna Richards.

A fairly frequent plant of mid-altitudes in the Uinta Mts. *Graham 8036* is a vegetative specimen which has pinnately divided leaves and so approaches Rydberg's *Potentilla concinnaeformis;* the other numbers are in flower.

Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7798;* Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8036;* Pot Creek road, NE. of Little Brush Creek Knob, 8000 ft., June 7, 1933, *Graham 8123.*

Potentilla diversifolia Lehm.

The following specimen is in the herbarium of F. J. Hermann at Ann Arbor, Michigan: alpine tundra, SE. slope of Mt. Emmons, 11,400 ft., July 19, 1933, *Hermann 5047.*

Potentilla filipes Rydb.

Potentilla gracilis Porter and Coulter, not Dougl.
Potentilla Hippiana pulcherrima S. Wats., in part
Potentilla pulcherrima Rydb., in part, not Lehm.

A common plant of mid-altitudes throughout the Basin. It is usually found in Aspen woodland or Sub-montane Shrub areas. All of the specimens are in flower.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6371;* S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6443, Graham 6454, Graham 6459;* SE. slope of Mosby Mt., 8000 ft., July 3, 1933, *Graham 8342;* NW. of Willow Springs, 9600 ft., July 10, 1935, *Graham 9535;* ridge W. of head of Post Canyon, 8000 ft., July 27, 1935, *Graham 9826.*

Potentilla glaucophylla Lehm.

Potentilla diversifolia glaucophylla Lehm.
Potentilla dissecta glaucophylla S. Wats.

A frequent species of upper altitude meadows and parks in the Uinta Mts. All of the specimens are in flower.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6575*, *Graham 6608;* meadow E. of Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8186;* Paradise Park, 10,000 ft., July 4, 1933, *Graham 8362;* Blanchard Park, head of Dry Fork Creek, 10,000 ft., July 5, 1933, *Graham 8392.*

Potentilla monspeliensis L.

A Eurasian introduction occurring throughout the Basin where it was collected in upper and mid-altitude meadows. Both specimens show flowers and developing achenes.

Near third Chain Lake, SE. of Mt. Emmons, 11,000 ft., July 21, 1933, *Graham 8578;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9879.*

Potentilla Nuttallii Lehm.

An infrequent plant throughout the Basin at mid-altitudes. Both specimens are in flower.

SE. slope of Mosby Mt., 8000 ft., July 3, 1933, *Graham 8348;* upper middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9729.*

Potentilla paradoxa Nutt.

An Asiatic introduction collected on the flood-plain of the Green River. The specimen is in late flower with maturing achenes.

W. of Green River, near Quarry "L," 4700 ft., June 20, 1931, *Graham 6134.*

Potentilla pentandra Engelm.

A frequent plant of the larger river flood-plains. The specimens all show maturing achenes.

W. side of Green River near Quarry "L," 4700 ft., June 18, 1931, *Graham 6089;* between Green River and Quarry "L," 4700 ft., June 20, 1931, *Graham 6135;* White River bottom near Utah-Colorado state line, July 6, 1908, *Douglass s. n.*

Potentilla perdissecta Rydb.

The following specimen is in the herbarium of F. J. Hermann at Ann Arbor, Michigan: timber line above fourth Chain Lake, 11,300 ft., July 20, 1933, *Hermann 5159* (also in Mo. Bot. Gard., Gray Herb., and Univ. Wyo.).

Potentilla pulcherrima Lehm.

Potentilla Hippiana pulcherrima S. Wats., in part
Potentilla pennsylvanica pulcherrima T. and G.

A rather frequent plant of upper and mid-altitudes throughout the Basin. The specimens all show flowers and maturing achenes.

On cliff above third Chain Lake, 10,900 ft., July 20, 1933, *Graham 8541;* on flood-plain of West Fork Creek just below Moon Lake, 8000 ft., June 25, 1935, *Graham 9379;* head of West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9673;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Potentilla quinquefolia Rydb.

The following specimen is in the herbarium of the Missouri Botanical Garden: shore of third Chain Lake, 11,100 ft., July 21, 1933, *Hermann 5188.*

Potentilla viridescens Rydb.

An infrequent species of low and mid-altitudes of the Uinta Mts. It is a northern species here reported from Utah for the first time. All of the specimens show late flowers and developing achenes.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6279;* up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6551;* Uinta River along Lapoint-Neola road, 5700 ft., June 22, 1935, *Graham 9300.*

Prunus melanocarpa (A. Nels.) Rydb. BLACK CHOKE CHERRY

Cerasus demissa melanocarpa A. Nels.

Common along streams and in canyons throughout the Basin at low or occasionally higher altitudes. It was also collected (*Graham 8100*) on the north slope of the Uinta Mts. in Jackson Draw. The leaves of the Choke Cherry, which contain hydrocyanic (prussic) acid, may cause death to animals which eat them. Sheep are often reported affected by eating the leaves. In the Uinta Basin the tree is of more or less sporadic occurrence and probably causes little harm.

Graham 7451 is a vegetative specimen showing autumn coloring; *Graham 7589* and *7992* show young leaves and immature inflorescences; *Graham 6369, 9669, 9862* and *9959,* are in fruit; the remaining numbers are in flower.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6300, Graham 6369;* W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6488,*

Graham 6497, *Graham 6502;* near Dry Fork, 10 mi. NW. of Vernal, 7000 ft., Sept. 5, 1931, *Graham 7451;* sand hills out Maeser road, 6000 ft., May 2, 1933, *Graham 7589;* rocky river bank, Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7992;* near spring, S. slope of Diamond Mt., 6000 ft., June 5, 1933, *Graham 8073;* E. side of Green River, Island Park, 4950 ft., June 11, 1935, *Graham 9190;* east tributary of Red Creek, 7500 ft., June 26, 1935, *Graham 9410;* Rock Creek below Willow Springs, 9200 ft., July 11, 1935, *Graham 9613;* head of West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9669;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9862;* bottom of Florence Canyon, 6000 ft., Aug. 1, 1935, *Graham 9959*.

Purshia tridentata (Pursh) DC. ANTELOPE BRUSH

Kuntzia tridentata (Pursh) Spreng.

Common throughout the Basin at mid-altitudes. It is an important secondary species of the Sub-montane Shrub Zone. *Graham 9764* and *9918* are in fruit; the remaining numbers show various stages of anthesis.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6380;* W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6483;* Vernal-Manila road N. of Vernal, 6500 ft., June 19, 1933, *Graham 8159;* near Little Lake, 8300 ft., June 23, 1933, *Graham 8261;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9091;* east tributary of Red Creek, 7500 ft., June 26, 1935, *Graham 9414;* middle fork of Stuart Creek, Colo., 7500 ft., July 18, 1935, *Graham 9764;* Post Canyon, 8000 ft., July 29, 1935, *Graham 9918*.

Rosa acicularis Lindl. var. **Bourgeauiana** Crép.

The single specimen cited is in bud, and from the Tavaputs Plateau. It is questionably identified.

NW. of Willow Springs, 9600 ft., July 10, 1935, *Graham 9571*.

Rosa chrysocarpa Rydb.

Frequent throughout the Basin at mid-altitudes. *Graham 6535* is in bud; the other specimens are in flower.

W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6500;* creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6535;* dugway S. out of Cottonwood Canyon, 6500 ft., July 6, 1935, *Graham 9512;* W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9696;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9867*.

Rosa manca Greene

Infrequent throughout the Basin; both specimens are in flower.

East side of Green River, Island Park, 4950 ft., June 11, 1935, *Graham 9189;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9473.*

Rosa melina Greene

The single flowering specimen cited was collected on the Tavaputs Plateau, where it was a conspicuous element in the Sub-montane Shrub Zone.

Willow Springs, 9550 ft., July 11, 1935, *Graham 9580.*

Rosa puberulenta Rydb.

Common throughout the Basin at low and mid-altitudes, where it is especially abundant along the banks of the larger streams. It was also collected (*Graham 8315*) in Pine Canyon on the south slope of the Book Cliffs. The August and September specimens show fruit; the others are in flower.

W. side of Green River near Quarry "L," 4700 ft., June 18, 1931, *Graham 6076;* W. side of Green River near Quarry "L," 4700 ft., June 22, 1931, *Graham 6205;* W. side of Green River near Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7359;* Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7381, Graham 7399;* Davis Hollow, Taylor Mt., 8700 ft., Sept. 7, 1931, *Graham 7492;* N. side of Strawberry River, 5 mi. below mouth of Red Creek, 6100 ft., June 19, 1935, *Graham 9270;* low ridge just below Moon Lake, 8000 ft., June 25, 1935, *Graham 9381;* Chandler Canyon, 6000 ft., Aug. 2, 1935, *Graham 9975;* White River, June 25, 1912, *Peterson s. n.;* White River, June 28, 1912, *Peterson s. n.*

Rubus melanolasius Focke RED RASPBERRY

Batidaea laetissima, *B. dacotica*, *B. unicolor*, and *B. Sandbergii* Greene

Rubus strigosus, of western reports

Common in the Uinta Mts. at mid- and upper altitudes, especially in Lodgepole Pine and Spruce-Fir woods, and sometimes in rocky situations near or just above tree line. All the specimens are in flower except *Graham 8627* and *10084*, which exhibit fruit.

W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6491;* slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6663;* NNW. of

Paradise Park, 11,000 ft., July 8, 1933, *Graham 8446;* between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 20, 1933, *Graham 8531;* W. side of Uinta River, at sheep bridge, 8500 ft., July 23, 1933, *Graham 8627;* ridge just below Moon Lake, 8000 ft., June 25, 1935, *Graham 9376;* Lodgepole-Spruce woods between Paradise Park and Chepeta Lake, 10,200 ft., Aug. 20, 1935, *Graham 10084.*

Rubus parviflorus Nutt.

Bossekia parviflora Greene
Rubacer parviflorum (Nutt.) Rydb.
Rubus nutkanus Moc.

Infrequent in mid-altitude woodlands of the Uinta Mts. The specimens show various stages of anthesis.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6441;* between sheep bridge, Uinta River, and Chain Lakes, 9000 ft., July 23, 1933, *Graham 8633;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Sibbaldia procumbens L.

This arctic-alpine Eurasian species is frequent in the Uinta Mts. in the uppermost forested zones and above the timber line. The specimens all show fruit at various stages of maturity, and the June specimen also bears flowers.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6571, Graham 6596, Graham 6618;* Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8193;* third Chain Lake, SE. slope of Mt. Emmons, 11,000 ft., July 21, 1933, *Graham 8581;* Paradise Park, 10,200 ft., Aug. 16, 1935, *Graham 10046.*

Sieversia ciliata (Pursh) D. Don

Erythrocoma dissecta, E. ciliata Greene
Geum ciliatum Pursh

The single flowering specimen cited was collected in the Uinta Mts. Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8191.*

Sieversia turbinata Greene

Acomastylis arapahoensis Daniels
Acomastylis turbinata (Rydb.) Greene
Geum turbinatum Rydb.
Potentilla nivalis Torr.
Sieversia scapoidea A. Nels.

Common in meadows of the Uinta Mts. throughout the uppermost forested zone and above timber line, where, among the exposed

broken rocks of the summit, it forms the dominant plant in small meadow patches. All of the specimens are in flower.

Slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6627;* Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8037;* near Little Lake, 8500 ft., June 22, 1933, *Graham 8227;* Trout Creek Ranger Station, 9300 ft., June 22, 1933, *Graham 8235;* Paradise Park, 10,000 ft., July 4, 1933, *Graham 8369;* ridge NNW. of Paradise Park, 11,300 ft., July 8, 1933, *Graham 8427;* between E. ridge of Mt. Emmons and Chain Lakes, 11,300 ft., July 19, 1933, *Graham 8509;* head of Whiterocks River, 12,000 ft., Aug. 21, 1935, *Graham 10118.*

Sorbus scopulina Greene MOUNTAIN ASH

Pirus sambucifolia Porter, not Cham. and Schlecht.

A scarce but widespread species in the Basin in rocky situations of mid- and upper altitude forests. *Graham 8397* is a vegetative specimen; *Graham 9697* shows immature fruit.

Blanchard Park, head of Dry Fork Creek, 10,000 ft., July 5, 1933, *Graham 8397;* W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9697.*

LEGUMINOSAE

Astragalus aboriginorum Richards.

Uinta River, Duchesne County, 8000 ft., July 7, 1928, *Weight 84,* USFS 60997.

Astragalus argophyllus Nutt.

Xylophacos argophyllus (Nutt.) Rydb.

The single specimen cited is in flower.

Ainge Gulch, 5 mi. N. of Jensen, May 29, 1912, *Peterson s. n.*

Astragalus Beckwithii T. and G.

Phaca Beckwithii Piper

Phacomene Beckwithii (T. and G.) Rydb.

The single specimen cited shows both flowers and mature pods.

Head of Deep Channel Creek, Colo., 6400 ft., June 4, 1935, *Graham 9118.*

Astragalus bisulcatus Gray TWO-GROOVE LOCO WEED or

Diholcos bisulcatus (Hook.) Rydb. MILK VETCH

The single specimen cited is in flower. This species is one of those selenium indicator plants which is poisonous to stock. See Beath,

O. A. et.al. in Journ. Am. Pharm. Assoc. **23**: 94. 1934. It has apparently not been reported before from Utah, although occurring nearby both to the north and east. (See Oxytropis for true Loco Weeds).

Island Park-Diamond Mt. road 3 mi. E. of Vernal, 5300 ft., June 8, 1935, *Graham 9138.*

Astragalus ceramicus Sheldon

Phaca picta A. Gray

The specimens cited show both flowers and mature pods.

Ainge Gulch, 5 mi. N. of Jensen, May 29, 1912, *Peterson s. n.;* Ainge Gulch near Jensen, June 17, 1912, *Douglass s. n.*

Astragalus ceramicus Sheldon var. **longifolius** Rydb.

Psoralea longifolius Pursh

Infrequent at low altitudes. The May specimen is in flower; the mid-June number shows both flowers and fruit; the late June number shows mature pods.

Dry Fork, in Juniper Zone, 7000 ft., June 27, 1931, *Graham 6404;* E. side of Green River at Island Park, 5100 ft., June 11, 1935, *Graham 9201;* NE. of Dinosaur Quarry, May 30, 1912, *Peterson s. n.*

Astragalus Chamaeleuce Gray

Xylophacos pygmaeus (Nutt.) Rydb.

Common in the Mixed Desert Shrub Zone throughout the Basin. It is sometimes locally called "Popper." It prefers rocky situations, and is especially frequent on shale soils. *Graham 7791* and *9468* are atypical. The specimens indicate that the species flowers in late April and early May and develops fruit in late May.

5 mi. NW. of Dinosaur Quarry, 5500 ft., April 24, 1933, *Graham 7515;* bad lands N. of Skull Pass Quarry, 5000 ft., May 9, 1933, *Graham 7630;* 3 mi. W. of Dinosaur Quarry, 5500 ft., May 15, 1933, *Graham 7661;* hills E. of Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7684;* Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7791;* Pariette Mine, 10 mi. SE. of Myton, 5000 ft., May 26, 1933, *Graham 7863;* bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7925;* bench, head of Sand Wash, 5300 ft., May 30, 1933, *Graham 7967;* N. side of White River, 4 mi. NE. of mouth of Evacuation Creek, 5300 ft., May 7, 1935, *Graham 8779;* S. slope of Leland Bench, 5000 ft., May 13, 1935, *Graham 8828;* S. slope

of Leland Bench, 5000 ft., May 14, 1935, *Graham 8846;* E. of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8939;* W. of Willow Creek, Thorne's ranch, 5400 ft., May 23, 1935, *Graham 8967a;* shale knoll along Watson-Ouray road, 5 mi. W. of Bitter Creek, 6300 ft., May 26, 1935, *Graham 8992;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9468;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* Uinta Basin, June 29, 1912, *Peterson s. n.*

Astragalus Coltoni Jones

Homalobus Episcopus (S. Wats.) Rydb.
Astragalus Episcopus S. Wats.

This Utah endemic was collected only in the vicinity of the Dinosaur Quarry, in the upper Mixed Desert Shrub Zone. The specimens are in flower, except the May 30 and June numbers, which show legumes.

Dinosaur Quarry, 5000 ft., July 6, 1931, *Graham 6672;* hills E. of Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7703;* Ainge Gulch, 5 mi. N. of Jensen, May 29, 1912, *Peterson s. n.;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* NE. of Dinosaur Quarry, May 30, 1912, *Douglass s. n.;* Ainge Gulch, W. of Dinosaur Quarry, June 17, 1912, *Douglass s. n.*

Astragalus convallarius var. **diversifolius** (Gray) Tidestrom See Proc. Biol. Soc. Wash. **50**: 20. 1937.

Astragalus diversifolius Gray

Infrequent throughout the Basin in low and mid-altitudes, especially in Sub-montane Shrub. The specimens are in flower with *Graham 9491* showing immature legumes also.

Near Little Lake, 8300 ft., June 23, 1933, *Graham 8247;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9080;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9491;* White River, June 26, 1912, *Peterson s. n.;* Uinta Basin, June 26, 1912, *Peterson s. n.*

Astragalus convallarius var. **hylophilus** (Rydb.) Tidestrom See Proc. Biol. Soc. Wash. **50**: 20. 1937.

Astragulus hylophilus (Rydb.) A. Nels.
Homalobus hylophilus Rydb.

Frequent throughout the Basin at mid-altitudes, especially in Aspen woodland or upper Sub-montane Shrub. The specimens are in flower, with *Graham 9946* showing maturing legumes as well. At the

head of Hill Creek the natives claimed that this plant was killing their sheep. Its poisonous properties and habitat have been discussed by Beath in Ecology **17**: 692-694. 1936 and by Graham in Ecology **18**: 171. 1937.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6440;* near Little Lake, 8300 ft., June 23, 1933, *Graham 8242;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9480;* Rock Creek, near Willow Springs, 9200 ft., July 11, 1935, *Graham 9589;* head of Hill Creek, 8500 ft., July 31, 1935, *Graham 9946.*

Astragalus cymboides Jones

Xylophacos cymboides (Jones) Rydb.

The single specimen of this Utah endemic cited is in flower.

Hills E. of Dinosaur Quarry, 5000 ft., April 29, 1933, *Graham 7575.*

Astragalus detritalis Jones

Homalobus detritalis (Jones) Rydb. See N. A. Flora **24**: 259. 1929.

The single specimen cited is in flower. This species was previously known only from the type locality, Theodore (now Roosevelt), Utah, where it was collected by Marcus E. Jones who described it in his Contributions to Western Botany, No. 13, p. 9, 1910.

Bench, head of Sand Wash, 5300 ft., May 30, 1933, *Graham 7960.*

Astragalus duchesnensis Jones

Lonchophaca duchesnensis (Jones) Rydb.

Frequent in rocky situations and bad lands of the Mixed Desert Shrub Zone throughout the Basin. All of the specimens are in flower.

Hills N. of Dinosaur Quarry, 5000 ft., April 28, 1933, *Graham 7545;* flat SE. of Jensen, 5000 ft., May 5, 1933, *Graham 7604;* bad lands N. of Skull Pass Quarry, 5000 ft., May 9, 1933, *Graham 7634;* hills E. of Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7704;* S. of Pariette Mine, upper Sand Wash, 5000 ft., May 26, 1933, *Graham 7849;* Ouray-Bonanza road 14 mi. E. of Ouray, 4800 ft., May 9, 1935, *Graham 8795;* S. slope of Leland Bench, 5000 ft., May 13, 1935, *Graham 8821.*

Astragalus flavus Nutt.

Cnemidophacos flavus (Nutt.) Rydb.

Common throughout the Basin in the Mixed Desert Shrub Zone. All of the specimens are in flower.

Skull Pass Quarry, 5000 ft., May 6, 1933, *Graham 7622a;* Pariette Mine, 10 mi. SE. of Myton, 5000 ft., May 26, 1933, *Graham 7862;* Desert Springs, 5300 ft., May 30, 1933, *Graham 7955;* Ouray-Bonanza road, 14 mi. E. of Ouray, 4800 ft., May 9, 1935, *Graham 8799;* S. slope of Leland Bench, 5000 ft., May 13, 1935, *Graham 8826;* S. slope of Leland Bench, 5000 ft., May 14, 1935, *Graham 8847;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9096;* head of Deep Channel Creek, Colo., 6400 ft., June 4, 1935, *Graham 9116;* Pariette Bench, 12 mi. SW. of Ouray, 5000 ft., June 22, 1933, *Doutt 880;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.*

Astragalus flexuosus Dougl.

Homalobus flexuosus (Dougl.) Rydb.

Collected only on the Tavaputs Plateau at the southeast Basin rim. *Graham 9719* is in flower; *Graham 9751* shows matured legumes.

Middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9719;* middle fork of Stuart Creek, Colo., 7500 ft., July 18, 1935, *Graham 9751.*

Astragalus Geyeri Gray

Phaca annua Geyer, not *Astragalus annuus* DC.

Infrequent in the lower Mixed Desert Shrub Zone, where it occurs on Greasewood flats. The May specimen is in flower; the June numbers show mature pods.

Flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6141;* flat between Ouray and Quarry "L," 4700 ft., June 21, 1931, *Graham 6188;* Greasewood flat near marsh, mouth of Ashley Creek, 4800 ft., May 30, 1935, *Graham 9021.*

Astragalus Haydenianus Gray

Diholcos Haydenianus (Gray) Rydb.

Infrequent at mid-altitude in the Uinta Mts. Both specimens are in flower.

Mountain Home-Tabiona road 2 mi. W. of Rock Creek, 7600 ft., June 25, 1935, *Graham 9367;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Astragalus hypoglottis L.

Astragalus goniatus Nutt.

The single specimen cited, collected on the Basin's southwest rim, is in flower.

Below Mud Springs, 8800 ft., June 29, 1935, *Graham 9466.*

Astragalus inflexus Dougl.

Xylophacos inflexus (Dougl.) Rydb.

Collected only in the Mixed Desert Shrub Zone along the Green River above Jensen. The species is here reported from Utah for the first time, its range being extended southward from the north and northwest. The specimens are in flower, except the June number, which shows maturing pods.

Hills E. of Dinosaur Quarry, 5000 ft., April 29, 1933, *Graham 7573;* 3 mi. W. of Dinosaur Quarry, 5500 ft., May 15, 1933, *Graham 7658;* hills E. of Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7700;* Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9177.*

Astragalus megacarpus Gray

Phaca megacarpa Nutt.

The single specimen cited is in flower.

Burned-over slope of Calamity Ridge, S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6500 ft., June 1, 1935, *Graham 9060.*

Astragalus moencoppensis Jones

Cnemidophacos moencoppensis (Jones) Rydb.

The specimens cited, all collected in the Mixed Desert Shrub Zone, are in flower. Further collections of this plant, with fruiting specimens, may prove it to be a species now undescribed. While very much like *Astragalus moencoppensis* in habit, our specimens have the simple, but much longer, leaves of *Astragalus spatulatus* and its allies.

Near Skull Pass Quarry, 5000 ft., May 6, 1933, *Graham 7613a;* bad lands N. of Skull Pass Quarry, 5000 ft., May 9, 1933, *Graham 7648;* N. of Dinosaur Quarry, 5500 ft., May 18, 1933, *Graham 7718;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* Ainge Gulch, 5 mi. N. of Jensen, May 29, 1912, *Peterson s. n.*

Astragalus pubentissimus T. and G.

Phaca pubentissima (T. and G.) Rydb.

Frequent throughout the Basin in the Mixed Desert Shrub Zone.

All of the specimens are in flower, with *Graham 7951* showing immature legumes also.

Greasewood flat, S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7868;* Desert Springs, 5300 ft., May 30, 1933, *Graham 7951;* box canyon entering White River from N., 4 mi. NE. of mouth of Evacuation Creek, 5300 ft., May 6, 1935, *Graham 8765;* E. of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8941;* Uinta Basin, July 13, 1912, *Peterson s. n.*

Astragalus Purshii Dougl.

Xylophacos Purshii (Dougl.) Rydb.

The single specimen cited is in late anthesis.

Burned-over Calamity Ridge, S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6500 ft., June 1, 1935, *Graham 9064.*

Astragalus simplex Tidestrom See Contr. U. S. Nat. Herb. **25**: 322, 330. 1925.

Astragalus spatulatus var. *simplex* Tidestrom

Homalobus brachycarpus Nutt.

The specimens cited are in flower.

Cottonwood Springs, Little Mt., 6600 ft., May 22, 1933, *Graham 7783;* N. side of White River, 4 mi. NE. of mouth of Evacuation Creek, 5400 ft., May 8, 1935, *Graham 8789.*

Astragalus spatulatus Sheld. WILD INDIGO

Astragalus caespitosus Gray, not Pallas

Homalobus caespitosus Nutt.

Common throughout the Basin at low altitudes, especially on exposed, rocky slopes. The specimens are all in flower with the June numbers showing developing legumes also. *Graham 9127* is a white-flowered form.

Asphalt Ridge, SW. of Vernal, 6000 ft., May 1, 1933, *Graham 7578;* Cottonwood Springs, Little Mt., 6600 ft., May 22, 1933, *Graham 7787;* Asphalt Ridge, S. of Vernal-Lapoint Road, 4 mi. SW. of Vernal, 6000 ft., May 25, 1933, *Graham 7838;* junction of Juniper and Aspen Zones, Uinta River Canyon, 7000 ft., June 2, 1933, *Graham 8052;* N.-facing slope of Diamond Mt. plateau, 6500 ft., June 5, 1933, *Graham 8082;* Leota road near Highway US 40, 15 mi. SW. of Vernal, 5000 ft., May 21, 1935, *Graham 8916;* burned-over Calamity Ridge, S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6500

ft., June 1, 1935, *Graham 9052;* S. rim of Blue Mt., 15 mi. E. of Jensen, 7500 ft., June 5, 1935, *Graham 9127* (the flowers of this number are white, with lavender-striped standards).

Astragalus tenellus Pursh

Homalobus tenellus (Pursh) Britton

Frequent at mid-altitudes throughout the Basin. The specimens all show flowers and legumes in various stages of development.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6374;* Pass, head of Smith Wells Draw, 7500 ft., June 28, 1933, *Graham 8325;* divide between Smith Wells Draw and Minnie Maud tributary, 30 mi. SW. of Myton, 7100 ft., July 5, 1935, *Graham 9500;* ridge W. of head of Post Canyon, 8000 ft., July 27, 1935, *Graham 9839;* Red Creek, 2 mi. N. of Fruitland, 6700 ft., Aug. 16, 1936, *Doutt 4325.*

Astragalus vespertinus Sheld.

Xylophacos vespertinus (Sheld.) Rydb.

Both of the specimens cited are in flower, and were collected on Green River shale.

S. of Pariette Mine, upper Sand Wash, 5000 ft., May 26, 1933, *Graham 7840;* box canyon entering White River from N., 4 mi. NE. of mouth of Evacuation Creek, 5300 ft., May 6, 1935, *Graham 8770.*

Glycyrrhiza lepidota Nutt. LIQUORICE

A common species on flood-plains of the larger streams in the Mixed Desert Shrub Zone, where it usually grows in shaded depressions. *Graham 6173* and *Peterson s. n.* are in flower; *Graham 7360* and *9809* show mature pods; *Doutt 896* shows flowers and young legumes.

Flat between Ouray and Quarry "L," 4700 ft., June 21, 1931, *Graham 6173;* W. side of Green River, near Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7360;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9809;* Ouray, junction of White and Green Rivers, July 1, 1933, *Doutt 896;* Uinta Basin, July 13, 1912, *Peterson s. n.*

Hedysarum cinerascens Rydb.

The May specimen is in flower; the July number shows a few flowers and mature legumes.

Bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7912;* divide between Smith Wells Draw and Minnie Maud tributary, 7100 ft., July 5, 1935, *Graham 9502.*

Hedysarum utahense Rydb.

Common throughout the Basin at mid-altitudes, especially in open areas. For the most part the May and early June specimens are in flower; the later ones show varying stages of maturing legumes.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6299;* Vernal-Manila road N. of Vernal, 6500 ft., June 19, 1933, *Graham 8156;* W. of Willow Creek, Thorne's ranch, 5400 ft., May 23, 1935, *Graham 8954;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6000 ft., May 31, 1935, *Graham 9044;* Mountain Home-Tabiona road 1 mi. W. of Rock Creek, 8000 ft., June 25, 1935, *Graham 9365;* middle fork of Stuart Creek, Colo., 7500 ft., July 18, 1935, *Graham 9755;* ridge W. of head of Post Canyon, 8000 ft., July 27, 1935, *Graham 9842;* Uinta Basin, S. of Red Bluff Wash, May 24, 1908, *Douglass s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.;* Uinta Basin, June 26, 1912, *Peterson s. n.;* Uinta Basin, July 13, 1912, *Peterson s. n.*

Lathyrus coreaceus White

Apparently entering the Basin from the west and confined to Aspen woodlands where it is often very common. In places, as at Red Creek, it forms almost the sole ground cover under the Aspen trees. The specimens are in flower, with *Graham 9452* showing maturing legumes also.

Head of Horse Creek, 7800 ft., June 17, 1935, *Graham 9221;* W. side of Red Creek, 7500 ft., June 27, 1935, *Graham 9452;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9486.*

Lathyrus utahensis M. E. Jones

Lathyrus Bradfieldiensis A. Nels.

The single specimen cited, from the extreme west end of the Basin where it was growing under Aspens, is in flower.

Head of Horse Creek, 7800 ft., June 17, 1935, *Graham 9226.*

Lupinus alpestris A. Nels.

The single specimen cited, from the southeast Basin rim, shows flowers and maturing legumes.

All species of the genus Lupinus are considered poisonous, and cause particularly heavy loss among sheep, especially in late summer and fall, for then the particularly poisonous pods are developed. The seeds within the pods are most toxic but other parts of the plant may likewise be harmful. There are no medicinal remedies for the poison,

which in sheep causes frenzy, spasms, and, in fatal cases, death in convulsions.

West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9684*.

Lupinus argenteus Pursh

Frequent throughout the Basin at low altitudes. *Graham 6401* shows matured pods; *Graham 9711* and *9722* exhibit both flowers and mature legumes; the other specimens are in flower.

Dry Fork, in Juniper Zone, 7000 ft., June 26, 1931, *Graham 6401;* Douglass Canyon, W. of Dinosaur Quarry, 5000 ft., May 19, 1933, *Graham 7731;* S. of Badland Creek, 8 mi. S. of Jensen, 5000 ft., May 27, 1935, *Graham 8999;* Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9182;* Piceance Creek, 5-10 mi. below Rio Blanco, Colo., 7000 ft., July 17, 1935, *Graham 9711;* middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9722*.

Lupinus barbiger Wats.

The species is a Utah endemic reported previously only from the southern part of the state. Both specimens are in flower, *Graham 9627* being a white-flowered form.

Rock Creek, near Willow Springs, 9200 ft., July 11, 1935, *Graham 9611;* E. rim of Range Creek, near Willow Springs, 9700 ft., July 13, 1935, *Graham 9627*.

Lupinus brevicaulis Wats.

The single specimen cited is in flower.

S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9081*.

Lupinus caudatus Kellogg

Lupinus aduncus Greene

The single specimen cited shows both flowers and matured legumes.

Uinta River, W. of Lapoint, 5700 ft., July 23, 1933, *Graham 8613*.

Lupinus laxiflorus Dougl.

Elkhorn Ranger Station [6650 ft.] July 28, 1911 (?), *DeMoisy Jr. 75*, USFS 17327.

Lupinus parviflorus Nutt.

Common throughout the Basin at mid- and upper altitudes, especially in the Sub-montane Shrub and Aspen Zones. *Graham 7409*,

7479, and *10057* show mature legumes; *Graham 9838* shows flowers and immature pods; the remaining numbers are in flower.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6223*, *Graham 6278;* S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6446;* Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7409;* Davis Hollow, Taylor Mt., 8700 ft., Sept. 7, 1931, *Graham 7479;* E. of Paradise Park, 10,000 ft., July 4, 1933, *Graham 8380;* SW. of Moon Lake, 8100 ft., June 24, 1935, *Graham 9350;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9467;* Willow Springs, 9550 ft., July 10, 1935, *Graham 9550;* Rock Creek, near Willow Springs, 9200 ft., July 11, 1935, *Graham 9602;* ridge W. of head of Post Canyon, 8000 ft., July 27, 1935, *Graham 9838;* Paradise Park, 10,000 ft., Aug. 16, 1935, *Graham 10057;* Diamond Mt., Aug. 5-7, 1912, *Douglass s. n.*

Lupinus pusillus Pursh

Common throughout the Basin in the Mixed Desert Shrub Zone. It is sometimes locally called "Bluebell." *Graham 6186* shows matured legumes only; *Graham 9141* and *Douglass s. n.* exhibit flowers and immature pods; the remaining numbers are in flower, *Graham 8906a* being a white-flowered form.

Flat between Ouray and Quarry "L," 4700 ft., June 21, 1931, *Graham 6186;* S. of Pariette Mine, upper Sand Wash, 5000 ft., May 26, 1933, *Graham 7844;* S. slope of Leland Bench, 5000 ft., May 13, 1935, *Graham 8818;* Uteland Mine, Green River, 4800 ft., May 15, 1935, *Graham 8863;* Uteland Mine, Green River, 4800 ft., May 17, 1935, *Graham 8906a;* Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9141;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* Ainge Gulch, W. of Dinosaur Quarry, June 17, 1912, *Douglass s. n.*

Lupinus sericeus Pursh

Frequent throughout the Basin, especially in the Sub-montane Shrub Zone. All of the specimens cited are in flower, with *Graham 9853* showing matured legumes also. A specimen (*Graham 9529*) was also collected at the head of Soldier Creek in the Book Cliffs.

Near Little Lake, 8300 ft., June 23, 1933, *Graham 8260;* SE. slope of Mosby Mt., 8000 ft., July 3, 1933, *Graham 8352;* ridge W. of head of Post Canyon, 8000 ft., July 27, 1935, *Graham 9853.*

Lupinus tenellus Dougl.

Paradise Park, Uintah County, 10,000 ft., Aug. 15, 1928, *Weight 171*, USFS 61046.

Medicago lupulina L. BLACK MEDICK, NONESUCH

The specimen of this Eurasian introduction cited shows flowers and immature fruit.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6285*.

Medicago sativa L. ALFALFA, LUCERNE

The specimen cited is in flower; it had escaped from cultivation. Alfalfa is one of the most important crops of the Basin.

W. side of Green River, near Quarry "L," 4700 ft., June 22, 1931, *Graham 6213*.

Melilotus alba Desv. WHITE SWEET CLOVER

The specimen of this Eurasian introduction cited is in flower.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6298*.

Melilotus officinalis (L.) Lam. YELLOW SWEET CLOVER

Trifolium melilotus officinalis L.

The specimens of this European introduction cited show flowers and maturing legumes. A specimen (*Graham 8104*) was also collected in Jackson Draw on the north slope of the Uinta Mts.

W. side of Green River near Quarry "L," 4700 ft., June 22, 1931, *Graham 6198;* along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7420*.

Oxytropis albiflorus (A. Nels.) K. Schum. WHITE LOCO

Aragallus albiflorus A. Nels.

Both flowering specimens cited were collected on Green River shale near the center of the Basin, in the Mixed Desert Shrub Zone.

S. of Pariette Mine, upper Sand Wash, 5000 ft., May 26, 1933, *Graham 7845;* bench, head of Sand Wash, 5300 ft., May 30, 1933, *Graham 7963*.

Oxytropis Lambertii Pursh PURPLE LOCO

Aragallus Lambertii (Pursh) Greene

Infrequent throughout the Basin at mid-altitudes. All of the specimens are in flower, with *Graham 9764a* showing developing legumes as well.

The name "White Loco" has sometimes inappropriately been applied to *O. Lambertii* instead of to the preceding species, while the name "Purple Loco" has been given to *Astragalus mollissimus*, better called the "Woolly Loco," which we have not found in the Basin. This and the above species belong to that group of poisonous legumes known as Loco Weeds, which in many parts of western North America cause such heavy losses among cattle, sheep, and horses, especially the latter. In the Uinta Basin these species are not particularly abundant, however, and the damage they do is perhaps much less than in many other regions.

Basin rim near Willow Springs, 9600 ft., July 12, 1935, *Graham 9623;* middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9721;* middle fork of Stuart Creek, Colo., 7500 ft., July 18, 1935, *Graham 9764a.*

Oxytropis multiceps minor Gray

Aragallus minor (Gray) Cockerell

The single specimen cited is in flower. It is reported from Utah for the first time, having previously been known only from Colorado and Wyoming.

Shale knoll 5 mi. W. of Bitter Creek along Watson-Ouray road, 6300 ft., May 26, 1935, *Graham 8989.*

Psoralea mephitica S. Wats.

Infrequent in sandy areas of the Mixed Desert Shrub Zone. All of the specimens cited, which are in flower, were collected in the north-central part of the Basin.

Hills E. of Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7690;* Leota road near Highway US 40, 15 mi. SW. of Vernal, 5000 ft., May 21, 1935, *Graham 8913;* Red Bluff Wash, between White and Green Rivers, May 27, 1908, *Douglass s. n.;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.*

Psoralea stenostachys Rydb.

The single specimen of this Utah endemic cited is in flower; it is sometimes considered to be a form of *Psoralea lanceolata* Pursh.

Dry Fork, in Juniper Zone, 7000 ft., June 27, 1931, *Graham 6405.*

Sphaerophysa salsula (Pall.) DC.

The specimen cited, which shows both flowers and mature legumes, is the first specimen of this central Asiatic species to be collected in

North America. A. J. Alexander, of the New York Botanical Garden, also collected the species in Colorado in late August, 1936, and has published a note on it (See Torreya **37**: 35-36. 1937). The plant has probably been introduced among seed.

Red Creek, 2 mi. N. of Fruitland, 6700 ft., Aug. 14, 1936, *Doutt 4312*.

Thermopsis montana Nutt.

Frequent throughout the Basin in a wide range of altitudes, where it usually grows in rather moist situations. *Graham 10157*, which approaches *T. xylorrhiza* or *T. divaricarpa* of A. Nelson, is in fruit; *Graham 6244* and *9276* show both flowers and developing legumes; the remaining numbers are in flower.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6244;* Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7991;* Uinta River E. of Hayden, 5700 ft., June 2, 1933, *Graham 8044;* small lake E. of Paradise Park, 10,000 ft., July 4, 1933, *Graham 8379;* N. side of Strawberry River, 5 mi. below mouth of Red Creek, 6100 ft., June 19, 1935, *Graham 9276;* one mi. W. of Baxter Pass, Colo., 8300 ft., Aug. 29, 1935, *Graham 10157*.

Thermopsis ovata (B. L. Robins.) Rydb.

Frequent at low or occasionally mid-altitudes, the specimens cited being from the north-central part of the Basin. The numbers cited are all in flower.

Marsh along Green River below Jensen, 5000 ft., April 27, 1933, *Graham 7539;* hills E. of Dinosaur Quarry, 5000 ft., April 29, 1933, *Graham 7566;* 3 mi. W. of Dinosaur Quarry, 5500 ft., May 15, 1933, *Graham 7653;* near spring, S. slope of Diamond Mt., 6000 ft., June 5, 1933, *Graham 8076;* S. rim of Blue Mt., Colo., 15 mi. E. of Jensen, 7500 ft., June 5, 1935, *Graham 9128*.

Trifolium dasyphyllum T. and G.

Trifolium scariosum A. Nels.

The single specimen cited, from the Alpine Zone of the Uinta Mts., is in flower.

Head of West Fork of Whiterocks River, 11,600 ft., Aug. 21, 1935, Graham *10114*.

Trifolium gymnocarpon Nutt.

Frequent throughout the Basin at mid-altitudes. All of the speci-

mens are in flower, with *Graham 9034* and *9110* showing developing legumes as well.

Pot Creek road NE. of Little Brush Creek Knob, 8000 ft., June 7, 1933, *Graham 8122;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6000 ft., May 31, 1935, *Graham 9034;* head of Deep Channel Creek, near Price Creek, Colo., 6400 ft., June 4, 1935, *Graham 9110;* 10 mi. W. of Youghall, Colo., 7700 ft., June 5, 1935, *Graham 9130.*

Trifolium Parryi A. Gray

The single specimen cited, collected in a Lodgepole Pine Zone meadow of the Uinta Mts., is in flower.

Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8196.*

Trifolium pratense L. RED CLOVER

Both specimens of this cultivated species cited are in flower.

Ashley Creek, near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6255;* irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7421.*

Trifolium repens L. WHITE CLOVER

The specimens of this cultivated species cited show varying stages of anthesis.

W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6477;* Davis Hollow, Taylor Mt., 8700 ft., Sept. 7, 1931, *Graham 7481;* SW. of Moon Lake, 8100 ft., June 24, 1935, *Graham 9356;* West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9647.*

Trifolium Rydbergii Greene

Trifolium longipes reflexum A. Nels.

The single specimen cited is in flower.

Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Vicia americana Muhl.

Infrequent throughout the Basin at mid-altitudes, especially in wooded canyons. All of the specimens are in flower. The leaves of *Graham 8079,* in their cuneate base and toothed apex, approach those of *V. pumila* Heller.

Near spring, S. slope of Diamond Mt., 6000 ft., June 5, 1933, *Graham 8079;* Rock Creek, near Willow Springs, 9300 ft., July 11, 1935, *Graham 9612;* West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9668.*

Vicia oregana Nutt.

Infrequent throughout the Basin at mid-altitudes. All of the specimens are in flower.

N. side of Strawberry River, 5 mi. below mouth of Red Creek, 6100 ft., June 19, 1935, *Graham 9277;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9487;* Willow Springs, 9700 ft., July 10, 1935, *Graham 9556;* Willow Springs, 9500 ft., July 10, 1935, *Graham 9565.*

Vicia trifida Dietr.

The single specimen cited is in flower.

S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6000 ft., May 31, 1935, *Graham 9050.*

GERANIACEAE

Geranium Richardsonii Fisch. and Trautv.

Geranium albiflorum Hook.
Geranium gracilentum Greene

Frequent in mid- or upper altitude woodlands of the Uinta Mts. A specimen (*Graham 8337*) was also collected in Pine Canyon, on the south slope of the Book Cliffs. All of the specimens show flowers except the August numbers which show maturing carpels. The specimens representing this genus have not been studied critically, and a different taxonomic disposal of them may be possible.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6589, Graham 6625;* Blanchard Park, head of Dry Fork Creek, 10,000 ft., July 5, 1933, *Graham 8394;* in Aspens, SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9336;* Chepeta Lake, 10,600 ft., Aug. 21, 1935, *Graham 10099;* head of West Fork of Whiterocks River, 11,600 ft., Aug. 21, 1935, *Graham 10131a;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Geranium viscosissimum F. and M.

Common at mid-altitudes throughout the Basin, especially in somewhat mesophytic spots in the Sub-montane Shrub and Aspen Zones. For the most part the June specimens show flowers; the later numbers exhibit carpels in varying degrees of development.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6348, Graham 6373;* Aspen thicket, near Little Lake, 8500 ft., June 22, 1933, *Graham 8220;* Horse Creek, 7700 ft., June 18, 1935, *Graham 9261;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9469;* meadow-

pasture NW. of Willow Springs, 9600 ft., July 10, 1935, *Graham 9563;* head of West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9663;* upper middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9738;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9870.*

LINACEAE

Linum Kingii sedoides Porter YELLOW FLAX

Cathartolinum sedoides (Porter) Small
Linum Kingii pinetorum M. E. Jones

The single specimen of this Utah endemic cited shows both flowers and mature capsules.

Rocky exposure, E. crest of Whiterocks Canyon, between Red Pine and Paradise Creeks, 10,000 ft., Aug. 17, 1935, *Graham 10060.*

Linum Lewisii Pursh BLUE FLAX

Common throughout the Basin at low and mid-altitudes. The early specimens, for the most part, show flowers; the later ones exhibit developing and mature capsules.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6376;* bench, head of Sand Wash, 5300 ft., May 30, 1933, *Graham 7965;* near Little Lake, 8300 ft., June 23, 1933, *Graham 8258;* E. of Willow Creek, Thorne's ranch, 5300 ft., May 24, 1935, *Graham 8970;* burned-over Calamity Ridge, S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6500 ft., June 1, 1935, *Graham 9063;* N.-facing slope of E. side-canyon 3 mi. above mouth of Red Creek, 6300 ft., June 19, 1935, *Graham 9288;* Rock Creek, near Willow Springs, 9200 ft., July 11, 1935, *Graham 9583;* E. rim of Range Creek, near Willow Springs, 9600 ft., July 12, 1935, *Graham 9620;* middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9731;* ridge W. of head of Post Canyon, 8000 ft., July 27, 1935, *Graham 9844;* head of Hill Creek, 8500 ft., July 31, 1935, *Graham 9943;* Uinta Basin, June 29, 1912, *Peterson s. n.;* Uinta Basin, July 1, 1912, *Peterson s. n.;* Willow Creek, Thorne's ranch, 5300 ft., June 15, 1935, *Thorne s. n.*

EUPHORBIACEAE

Chamaesyce Fendleri (T. and G.) Small

Euphorbia Fendleri T. and G.

Frequent throughout the central Basin in the Mixed Desert Shrub

Zone, especially in sandy situations. All of the specimens are in flower except the July numbers, which show maturing fruit.

Sandy Wash, W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7904;* bench W. of Green River, S. of mouth of Sand Wash, 5000 ft., May 29, 1933, *Graham 7948;* vicinity of Desert Springs, 5500 ft., May 30, 1933, *Graham 7958;* S. slope of Leland Bench, 5000 ft., May 13, 1935, *Graham 8832;* bench W. of Green River, S. of Uteland Butte, 4800 ft., May 16, 1935, *Graham 8890;* E. of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8948;* Bluffs between White and Green Rivers, July 1, 1908, *Douglass s. n.;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.;* Uinta Basin, June 26, 1912, *Peterson s. n.;* Uinta Basin, July 13, 1912, *Peterson s. n.*

Chamaesyce serpyllifolia (Pers.) Small

Euphorbia serpyllifolia Pers.

Collected only on the flood-plain of the Green River. *Graham 10262* shows ripe, the other specimens maturing, fruit.

W. side of Green River, near Quarry "L," 4700 ft., June 18, 1931, *Graham 6075;* W. side of Green River, near Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7347;* W. side of Green River, near Quarry "L," 4700 ft., Sept. 11, 1935, *Graham 10262.*

Tithymalus robustus (Engelm.) Small

Euphorbia montana robusta Engelm.

Frequent throughout the Basin at low altitudes, especially on shale slopes. All of the specimens are in flower except *Graham 6274, 9160, 9757* (with fruit gone) and *Douglass s. n.*, which show maturing capsules.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6274;* W. of Willow Creek, Thorne's ranch, 5400 ft., May 23, 1935, *Graham 8955, Graham 8958;* shale knoll along Watson-Ouray road, 5 mi. W. of Bitter Creek, 6300 ft., May 26, 1935, *Graham 8994;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9099;* Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9160;* along road, Red Creek valley, 7500 ft., June 26, 1935, *Graham 9428;* middle fork of Stuart Creek, Colo., 7500 ft., July 18, 1935, *Graham 9757;* Devil's Play Ground, between White and Green Rivers, June 23, 1908, *Douglass s. n.*

CALLITRICHACEAE

Callitriche palustris L. WATER STARWORT

Callitriche verna L.

The single specimen of this Eurasian species cited is in fruit.

In small lake, brown with humic acid, NE. of Paradise Park, 10,200 ft., Aug. 16, 1935, *Graham 10026*.

ANACARDIACEAE

Rhus trilobata Nutt. SUMAC, SQUAW or SKUNK BUSH

Schmaltzia trilobata, *S. Bakeri*, *S. cognata*, *S. glomerata*, *S. subpinnata*, and *S. glabrata* Greene

Common throughout the Basin in the Mixed Desert Shrub Zone. It is a common understory shrub on the cottonwood-covered floodplains of the larger streams, and scarcely ever occurs in open rocky situations as it is reported to do in eastern Colorado. *Graham 6191* and *7379* represent late-flowering staminate plants; *Peterson s. n.* (June 28) is a vegetative specimen; the April and early May numbers show leafless flowering branches; the late May specimens exhibit flowers and developing leaves; the still later numbers for the most part show leafy fruiting branches. The Indians used the bark of this shrub in basketry.

W. side of Green River, near Quarry "L," 4700 ft., June 18, 1931, *Graham 6086;* flat between Ouray and Quarry "L," 4700 ft., June 21, 1931, *Graham 6181;* W. side of Green River, near Quarry "L," 4700 ft., June 22, 1931, *Graham 6191;* Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7379;* Douglass Canyon, W. of Dinosaur Quarry, 5000 ft., April 28, 1933, *Graham 7557;* Skull Pass Quarry, 5000 ft., May 6, 1933, *Graham 7621;* Orchid (Mud) Springs Canyon, 5000 ft., May 20, 1933, *Graham 7753;* W. of Green River, S. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7898*, *Graham 7899;* Green River, S. of Jensen, 4750 ft., May 2, 1935, *Graham 8751;* N. side of White River, 4 mi. NE. of mouth of Evacuation Creek, 5400 ft., May 7, 1935, *Graham 8780;* Cottonwood Canyon, 5700 ft., July 7, 1935, *Graham 9524;* White River bottom near Utah-Colorado state line, July 6, 1908, *Douglass s. n.;* Ainge Gulch, W. of Dinosaur Quarry, June 17, 1912, *Douglass s. n.;* White River, June 26, 1912, *Peterson s. n.;* White River, June 28, 1912, *Peterson s. n.;* Uinta Basin, July 13, 1912, *Peterson s. n.*

Toxicodendron Rydbergii (Small) Greene POISON IVY

Rhus Rydbergii Small

Toxicodendron hesperinum Greene, a large form

Scarce in the Basin where it occurs in moist shaded low altitude situations. *Graham 6266* is a vegetative, the other number a fruiting, specimen. The two specimens approach Greene's *Toxicodendron longipes*. It was also collected (*Graham 8115*) in Jackson Draw on the north slope of the Uinta Mts. It is poisonous to the touch, and causes a dermatitis, or irritation of the skin.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6266;* E. side of Green River, Island Park, 4950 ft., June 11, 1935, *Graham 9187*.

CELASTRACEAE

Forsellesia spinescens (A. Gray) Greene

Glossopetalon spinescens A. Gray

The single flowering specimen cited, collected on a shale knoll, was dwarfed, apparently having been persistently cropped by sheep.

N. side of White River, 4 mi. NE. of mouth of Evacuation Creek, 5300 ft., May 7, 1935, *Graham 8782*.

Pachystima Myrsinites (Pursh) Raf. MOUNTAIN LOVER

Ilex Myrsinites Pursh

Frequent in mid- and upper altitude forests throughout the Basin. It prefers rocky, shaded situations. *Graham 9197, 9915, 10160* and *10210* are vegetative specimens; the other numbers are in flower.

WNW. of Trout Creek Ranger Station, 10,000 ft., June 21, 1933, *Graham 8213;* near Little Lake, 8300 ft., June 23, 1933, *Graham 8240;* W. side of Uinta River at sheep bridge, 8500 ft., July 23, 1933, *Graham 8624;* west base of Blue Mt., E. side of Green River, Island Park, 5300 ft., June 11, 1935, *Graham 9197;* SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9330;* Rock Creek, near Willow Springs, 9300 ft., July 11, 1935, *Graham 9585;* ridge between Post and Florence Canyons, 8200 ft., July 29, 1935, *Graham 9915;* one mi. W. of Baxter Pass, Colo., 8300 ft., Aug. 29, 1935, *Graham 10160;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10210*.

ACERACEAE

Acer glabrum Torr. MOUNTAIN MAPLE

Acer neomexicana Greene

An infrequent tree throughout the Basin at mid-altitudes. *Graham 8125* shows flowers and immature leaves; the other specimens show leafy, fruiting branches. *Graham 9382, 9953,* and *10022* have small, trifoliolate leaves and somewhat smaller samaras and perhaps should be referred to forma *trisecta* Sarg.

Pot Creek road, Diamond Mt., 7000 ft., June 7, 1933, *Graham 8125;* between sheep bridge, Uinta River, and Chain Lakes, 9000 ft., July 23, 1933, *Graham 8636;* low ridge below Moon Lake, 8000 ft., June 25, 1935, *Graham 9382;* West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9701;* near head of Florence Canyon, 8000 ft., Aug. 1, 1935, *Graham 9953;* cliff side near Dry Fork town, 6500 ft., Aug. 12, 1935, *Graham 10022;* one mi. W. of Baxter Pass, Colo., 8300 ft., Aug. 29, 1935, *Graham 10161.*

Acer grandidentatum Nutt. BIG-TOOTHED or SHRUBBY MAPLE

Scarce but apparently scattered throughout the Basin. A specimen (*Graham 9630*) with tri-partite leaves was collected in Water Canyon on the south slope of the Book Cliffs. Both specimens cited are in fruit.

E. tributary of Red Creek, 7500 ft., June 26, 1935, *Graham 9411;* bottom of Florence Canyon, 6000 ft., Aug. 1, 1935, *Graham 9958.*

Acer interior Britton BOX ELDER, ASH-LEAVED MAPLE

Negundo interius (Britton) Rydb.

Frequent at low altitudes, particularly in narrow canyons and the valleys of smaller streams. The April specimen is in flower; the May number shows immature, the later numbers mature, fruit.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6251;* Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7378;* Dinosaur Quarry Canyon, 5000 ft., April 28, 1933, *Graham 7548;* N. of Dinosaur Quarry, 5500 ft., May 18, 1933, *Graham 7724.*

RHAMNACEAE

Ceanothus Fendleri A. Gray

Yellowstone, near Ranger Station pasture, 8000 ft., Duchesne County, June 24, 1928, *Starr 51,* USFS 61127.

Ceanothus Martini M. E. Jones

The single specimen cited, collected on the Tavaputs Plateau at the southernmost rim of the Basin, is in fruit.

Post Canyon, 8000 ft., July 29, 1935, *Graham 9926.*

Ceanothus velutinus Dougl.

Infrequent at mid-altitudes of the Uinta Mts. A specimen (*Graham 10194*) was also collected at the edge of Cart Creek Canyon, on the north drainage of the Uinta Mts. The August specimen is in fruit; the earlier numbers bear flowers.

W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6489;* SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9324;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Rhamnus Smithii Greene

The single specimen cited, collected at the east end of the Basin, is in fruit.

Piceance Creek 5-10 mi. below Rio Blanco, Colo., 7000 ft., July 17, 1935, *Graham 9709.*

MALVACEAE

Disella hederacea (Dougl.) Greene

Sida hederacea (Dougl.) Torr.

The single specimen cited is in flower.

Between Green River and Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7322.*

Sidalcea candida A. Gray

The single specimen cited, collected on the Tavaputs Plateau near the southeast rim of the Basin, is in flower.

Bitter Creek, 3 mi. E. of Utah-Colorado state line, 7800 ft., Aug. 30, 1935, *Graham 10175.*

Sphaeralcea coccinea (Pursh) Rydb.

Malvastrum coccineum (Pursh) A. Gray

Common throughout the Basin in the Mixed Desert Shrub Zone. It is locally called "Slippery Elm" and "Wild Geranium." It was also collected (*Graham 8107*) in Jackson Draw on the north slope of the Uinta Mts. All of the specimens are in varying stages of anthesis, except *Graham 6094*, which bears fruit. No attempt has here been made to separate this species complex into its possible segregates.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6094;* Orchid (Mud) Springs canyon, 5000 ft., May 20, 1933, *Graham 7747;* near Pariette Mine, 10 mi. SE. of Myton, 5000 ft., May 26, 1933, *Graham 7860, Graham 7861;* W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7936;* bench, head of Sand Wash, 5300 ft., May 30, 1933, *Graham 7956;* sandy dry wash along Ouray-Bonanza road, 14 mi. E. of Ouray, 4800 ft., May 9, 1935, *Graham 8792;* S. slope of Leland Bench, 5000 ft., May 13, 1935, *Graham 8827;* W. side of Duchesne River, 4 mi. above Ouray, 4800 ft., May 15, 1935, *Graham 8870;* E. of Willow Creek, near school house, 5300 ft., May 24, 1935, *Graham 8975;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6000 ft., May 31, 1935, *Graham 9031;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9101a;* Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9171;* 10 mi. S. of Moon Lake, E. side of W. Fork above mouth of East Fork (Yellowstone) Creek, 6900 ft., June 22, 1935, *Graham 9292;* Cottonwood Creek, 6000 ft., July 6, 1935, *Graham 9509;* middle fork of Stuart Creek, Colo., 7000 ft., July 19, 1935, *Graham 9772;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* Ainge Gulch, May 29, 1912, *Peterson s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.;* White River, June 28, 1912, *Peterson s. n.*

Sphaeralcea Munroana (Dougl.) Spach

In the Uinta Basin, where their ranges overlap, it is difficult to separate this species from the following one. Both specimens cited for *S. Munroana* approach *S. parvifolia*, just as some of the latter approach *S. Munroana*. *Graham 6149* is in flower; the other number shows mature carpels.

Flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6148, Graham 6149.*

Sphaeralcea parvifolia A. Nels. See Univ. Calif. Publ. Bot. **19**: 1-128. 1935.

Sphaeralcea marginata York

Frequent throughout the Basin in the Mixed Desert Shrub Zone. *Graham 6292, 9159, 9202a* and *Douglass s. n.* are in flower; the other specimens show varying stages of maturing carpels, some with old flowers. *Graham 8278, 9159* and *9202a* approach *Sphaeralcea Munroana, q. v.*

Between Green River and Quarry "L," 4700 ft., June 19, 1931,

Graham 6101; between Green River and Quarry "L," 4700 ft., June 20, 1931, *Graham 6130;* along road S. of Vernal, 5000 ft., June 23, 1931, *Graham 6292;* Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7393;* desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8278;* Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9159;* E. side of Green River, Island Park, 5000 ft., June 11, 1935, *Graham 9202a;* Uinta Basin, July 11, 1912, *Peterson s. n.*

GUTTIFERAE

Hypericum formosum H.B.K.

Yellowstone, Duchesne County, 8000 ft., July 20, 1928, *Weight 98*, USFS 61037.

TAMARICACEAE

Tamarix gallica L. TAMARISK

This European introduction is found on river sand bars or sandy shores. *Graham 7314* is a vegetative specimen; *Graham 9795* shows both flowers and fruit; *Graham 7345* exhibits fruit only.

W. side of Green River, near Quarry "L," 4700 ft., Aug. 29, 1931, *Graham 7314;* W. side of Green River near Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7345;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9795.*

VIOLACEAE

Viola adunca J. E. Smith BLUE VIOLET

Common throughout the Basin at mid-altitudes. All are in flower except *Graham 9872*, which shows ripened capsules, while *Graham 6458, 9337, 9357* and *9605* show maturing capsules as well as flowers. The specimens represent glabrous forms except *Graham 9240, 9337, 9600* and *9605*, which are scabrous in part also.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6313;* S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6458;* Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7793;* Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7984, Graham 7996;* Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8026;* Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8195;* Horse Creek, 7700 ft., June 18, 1935, *Graham 9240;* SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9337;* SW. of Moon Lake, 8,100

ft., June 24, 1935, *Graham 9357;* Rock Creek, near Willow Springs, 9200 ft., July 11, 1935, *Graham 9588, Graham 9600, Graham 9605;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9872.*

The following flowering numbers represent a glabrous, dwarfish form (*Viola bellidifolia* Greene):

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6602;* slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6632;* Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8184;* Paradise Park, 10,000 ft., July 4, 1933, *Graham 8365;* ridge NNW. of Paradise Park, 11,000 ft., July 8, 1933, *Graham 8421;* between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 19, 1933, *Graham 8496.*

Viola canadensis L. CANADA VIOLET

The single specimen cited, collected on the Tavaputs Plateau, shows flowers and capsules.

Rock Creek, near Willow Springs, 9200 ft., July 11, 1935, *Graham 9586.*

Viola nephrophylla Greene BLUE VIOLET

Frequent throughout the Basin at low and mid-altitudes. All of the specimens are in flower, with *Graham 8040, 9346,* and *9614* showing developing capsules also.

3 mi. W. of Dinosaur Quarry, 5500 ft., May 15, 1933, *Graham 7654;* Orchid (Mud) Springs Canyon, 5000 ft., May 20, 1933, *Graham 7758;* along Uinta River E. of Hayden, 5700 ft., June 2, 1933, *Graham 8040;* SW. of Moon Lake, 8100 ft., June 24, 1935, *Graham 9346, Graham 9360;* Rock Creek, near Willow Springs, 9200 ft., July 11, 1935, *Graham 9614.*

Viola pallens (Banks) Brain. WHITE VIOLET

Viola rotundifolia var. *pallens* Banks

Infrequent in mid- and upper altitudes of the Uinta Mts. All of the specimens are in flower, with *Graham 6623* and *9347* showing maturing capsules.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6616, Graham 6623;* Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7997;* Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8176;* SW. of Moon Lake, 8100 ft., June 24, 1935, *Graham 9347.*

Viola praemorsa Dougl. subsp. **linguaefolia** (Nutt.) Baker and Clausen
YELLOW VIOLET

Infrequent throughout the Basin at mid-altitudes. All of the specimens cited show flowers, with *Graham 9113* showing developing spring and cleistogamous capsules, and *Graham 9257* matured cleistogamous fruits.

East slope of Wolf Creek Pass, 9000 ft., June 16, 1933, *Graham 8147;* head of Deep Channel Creek, near Price Creek town, Colo., 6400 ft., June 4, 1935, *Graham 9113;* Horse Creek, 7700 ft., June 18, 1935, *Graham 9257*.

Viola rugulosa Greene BLUE STEMMED-VIOLET

The single specimen cited, from the Tavaputs Plateau near the southeast rim of the Basin, bears flowers and immature capsules.

Middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9744*.

Viola vallicola A. Nels. YELLOW VIOLET

Frequent throughout the Basin at mid-altitudes. All of the specimens show flowers with *Graham 8016* and *9129* showing maturing capsules as well. A large-leaved form with elongate leaves was also collected (*Graham 8096*) in Jackson Draw on the north slope of the Uinta Mts.

Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8016;* N.-facing edge of Diamond Mt. plateau, 6500 ft., June 5, 1933, *Graham 8084;* Dry Fork Creek just above Dry Fork town, 6700 ft., May 12, 1935, *Graham 8815;* head of Wolf Creek, Colo., 7700 ft., June 5, 1935, *Graham 9129* (transitional to *Viola praemorsa* subsp. *linguaefolia*).

Viola venosa (Wats.) Rydb. subsp. **typica** Baker and Clausen
YELLOW VIOLET

The single specimen cited, which shows flowers and young capsules, was collected on the northwest rim of the Basin.

East slope of Wolf Creek Pass, 9000 ft., June 16, 1933, *Graham 8139*.

LOASACEAE

Mentzelia albicaulis Dougl.

Acrolasia albicaulis (Dougl.) Rydb.

Frequent throughout the Basin at low altitudes. The specimens

represent a complex not here separated into its segregates. All of them are in flower except *Graham 7944* and the two Peterson specimens, which show immature fruit.

Between Dinosaur Quarry and Green River, 4800 ft., May 19, 1933, *Graham 7736;* Orchid (Mud) Springs Canyon, 5000 ft., May 20, 1933, *Graham 7763;* talus slope, S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7892;* bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7905;* bench W. of Green River, S. of mouth of Sand Wash, 5000 ft., May 29, 1933, *Graham 7944;* Vernal-Manila road N. of Vernal, 6500 ft., June 19, 1933, *Graham 8157;* rocky slope, W. side of Duchesne River, 4 mi. above Ouray, 4800 ft., May 15, 1935, *Graham 8864;* in sand, bench S. of Uteland Butte, below Ouray, 4800 ft., May 16, 1935, *Graham 8887;* W. side of Green River at Uteland Mine, below Ouray, 4800 ft., May 17, 1935, *Graham 8904;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Mentzelia chrysantha Engelm. See Ann. Mo. Bot. Gard. **21**: 171. 1934.

Nuttallia chrysantha Greene

The specimen cited seems to be intermediate between *M. chrysantha* and *M. multiflora* (Nutt.) Gray. While it has the obtuse petals of *M. multiflora*, the leaves are not deeply laciniate as in that species. In habit it approaches *M. chrysantha* although its leaves are even less deeply dentate and the upper noticeably broader near the base. It is from the southeast rim of the Basin and shows both flowers and fruit.

Middle fork of Stuart Creek, Colo., 7000 ft., July 19, 1935, *Graham 9775.*

Mentzelia humilis (Gray) Darlington See Ann. Mo. Bot. Gard. **21**: 155. 1934.

Mentzelia multiflora var. *humilis* Gray

Collected only in the southwestern quarter of the Basin at rather low altitudes. *Graham 9712* shows both flowers and fruit; the other specimens are in fruit.

Along Piceance Creek, 5-10 mi. below Rio Blanco, Colo., 7000 ft., July 17, 1935, *Graham 9712;* Hill Creek, 5000 ft., July 26, 1935, *Graham 9823;* dry, stony slope, Willow Creek, 2 mi. above Thorne's ranch, 5300 ft., June 29, 1933, *Doutt 883.*

CACTACEAE

Coryphantha neo-mexicana (Engelm.) Britt. and Rose

Mammillaria vivipara radiosa neo-mexicana Engelm.

The single specimen cited is in flower. The species is here reported from Utah for the first time, its range being extended northward.

Head of Deep Channel Creek, near Price Creek town, Colo., 6400 ft., June 4, 1935, *Graham 9122.*

Coryphantha vivipara (Nutt.) Britt. and Rose

Cactus viviparus Nutt.

Mammillaria vivipara (Nutt.) Haworth

The single specimen cited is in flower. It is here reported from Utah for the first time, its range being extended westward from the Great Plains.

Bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7908.*

Echinocereus mojavensis (Engelm. and Bigelow) Britt. and Rose

Cereus mojavensis Engelm. and Bigelow

Both specimens cited are in flower. Our specimens represent the northeastern limit of the range of the species.

Cottonwood Springs, Little Mt., 6600 ft., May 22, 1933, *Graham 7790;* near spring, S. slope of Diamond Mt., 6000 ft., June 5, 1933, *Graham 8085.*

Echinocereus octacanthus (Mühlenpfordt) Britt. and Rose

Echinopsis octacantha Mühlenpfordt

The single specimen cited is in flower. Our specimen represents the northernmost limit of the range of this species.

Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9146.*

Echinocereus triglochidiatus Engelm.

The single specimen cited is in flower. The species has been reported from Utah only once before, by Dixon (1935), from the plateaus of the south-central part of the state. Its range is extended slightly to the west and north by our specimen.

S. side of White River, along road, 4 mi. below mouth of Piceance Creek, Colo., 5700 ft., June 3, 1935, *Graham 9107.*

Neolloydia texensis Britt. and Rose

The single specimen cited is in flower. It was growing half-submerged in sand in the central Basin along the Green River, by which it may have worked its way northward. It was previously known only from the type locality, Sanderson, Texas, where it was collected in 1920 by MacDougal and Shreve.

Bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7941a*.

Opuntia hystricina Engelm. and Bigelow

The single specimen cited is in flower.

Vernal-Manila road N. of Vernal, 6000 ft., June 19, 1933, *Graham 8169*.

Opuntia juniperina Britt. and Rose

The two specimens cited are in flower. The species was known previously only from New Mexico, and is here reported from Utah for the first time.

Lapoint-Neola road at Uinta River, 5500 ft., June 22, 1935, *Graham 9312*, *Graham 9313*.

Opuntia phaeacantha Engelm.

The single specimen cited is in flower. The species is here reported from Utah for the first time, its range thus extended northward.

Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9143*.

Opuntia polyacantha Haworth

The single specimen cited, from near the southeast Basin rim, is in flower.

Middle fork of Stuart Creek, Colo., 7500 ft., July 18, 1935, *Graham 9763*.

Opuntia rhodantha Schum.

The most common cactus of the Basin, sometimes occurring in dense stands over fairly large, probably overgrazed areas of the lower Mixed Desert Shrub Zone. *Graham 7464* shows a dried fruit; *6172* and *6296* are in flower; and *6297* is a vegetative specimen.

In 1931, on the nineteenth of June, this species came into flower in the desert near Quarry "G," and on the same day near Pariette Mine, 40 miles away, members of another Carnegie Museum party observed the same species to be flowering profusely there. A few days

later there were scarcely any flowers to be observed. Perhaps this species, like certain night-blooming Cerei, is communal in its flowering.

Flat between Ouray and Quarry "L," 4700 ft., June 21, 1931, *Graham 6172;* along road S. of Vernal, 5000 ft., June 23, 1931, *Graham 6296, Graham 6297;* Dry Fork, in Juniper Zone, 7000 ft., Sept. 5, 1931, *Graham 7464.*

Pediocactus Simpsoni (Engelm.) Britt. and Rose

Common throughout the Basin in the Mixed Desert Shrub Zone. It occurs sparingly, however, and never occupies large areas as does *Opuntia rhodantha. Graham 7821a 8750, 8787a,* and *8998* are dried, boxed whole plants; the other numbers are herbarium sheets which show flowers.

Sand hills out Maeser road, 6000 ft., May 2, 1933, *Graham 7594;* sandy bench along Brush Creek, 5000 ft., May 16, 1933, *Graham 7765;* Cottonwood Springs, Little Mt., 6600 ft., May 22, 1933, *Graham 7789;* Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7821, Graham 7821a;* desert 9 mi. SSE. of Vernal, 5000 ft., May 2, 1935, *Graham 8750;* N. side of White River, 4 mi. NE. of mouth of Evacuation Creek, 5200 ft., May 8, 1935, *Graham 8787;* shale desert, N. side of White River, 4 mi. NE. of mouth of Evacuation Creek, 5300 ft., May 8, 1935, *Graham 8787a;* shale knoll among Juniper and Pinyon, 5 mi. W. of Bitter Creek along Watson-Ouray road, 6300 ft., May 26, 1935, *Graham 8998.*

Sclerocactus Whipplei (Engelm. and Bigelow) Britt. and Rose

Echinocactus Whipplei Engelm.

Both specimens cited show flowers; they were collected near the Green River in the central Basin. They represent the northwestern limit of the range of the species.

Tom Hyatt's ranch, near Skull Pass Quarry, 5000 ft., May 5, 1933, *Graham 7766;* rocky bench near Uteland Mine, 4800 ft., May 17, 1935, *Graham 8900.*

Utahia Sileri (Engelm.) Britt. and Rose

Echinocactus Sileri Engelm.

The specimens of this Utah endemic cited are questionably referred to this species, as the material is in poor shape. *Graham 7867* is a vegetative specimen; *Graham 8839* is in flower.

Pariette Desert, 10 mi. SE. of Myton, 5000 ft., May 26, 1933,

Graham 7867; rocky S. slope of Leland Bench, just N. of Pariette Creek, 5000 ft., May 13, 1935, *Graham 8839.*

ELAEAGNACEAE

Lepargyrea argentea (Pursh) Greene SOUR BUFFALO BERRY

Elaeagnus utilis A. Nels. See Am. Journ. Bot. **22**: 681-683. 1935.
Hippophae argentea Pursh
Shepherdia argentea Nutt.

Common throughout the Basin along stream banks of low altitude zones. *Graham 6192*, *Douglass s. n.*, and *Peterson s. n.* are vegetative specimens. *Graham 7559* shows staminate, *7769* pistillate flowers; the other numbers show fruit in various degrees of maturity. The berry is much used locally for jelly making.

W. side of Green River, near Quarry "L," 4700 ft., June 22, 1931, *Graham 6192;* Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6245;* Dinosaur Quarry, 5000 ft., July 6, 1931, *Graham 6675;* Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7380;* Douglass Canyon, W. of Dinosaur Quarry, 5000 ft., April 28, 1933, *Graham 7559;* Cottonwood Springs, Little Mt., 6600 ft., May 22, 1933, *Graham 7769;* Uinta River W. of Lapoint, 5700 ft., July 23, 1933, *Graham 8610;* Uinta River along Lapoint-Neola road, 5700 ft., July 22, 1935, *Graham 9297;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9812;* White River bottom near Utah-Colorado state line, July 6, 1908, *Douglass s. n.;* Uinta Basin, July 13, 1912, *Peterson s. n.*

Lepargyrea canadensis (L.) Greene BITTER BUFFALO BERRY

Elaeagnus canadensis (L.) A. Nels. See Am. Journ. Bot. **22**: 681-683. 1935.
Hippophae canadensis L.
Shepherdia canadensis (L.) Nutt.

Fairly frequent in upper altitude woodlands of the Uinta Mts. *Graham 7484* and *10058* are vegetative specimens; the other numbers are in fruit.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6447;* Davis Hollow, Taylor Mt., 8700 ft., Sept. 7, 1931, *Graham 7484;* Blanchard Park, head of Dry Fork Creek, 10,000 ft., July 5, 1933, *Graham 8402;* Lodgepole forest between Paradise Park road and rocky E. bluff of Whiterocks Canyon, 9800 ft., Aug. 17, 1935, *Graham 10058.*

LYTHRACEAE

Ammannia coccinea Rottb.

Ammannia alcalina Blankinship
Ammannia latifolia T. and G., not L.

The single specimen cited, collected on Green River lowland, is in fruit, with flowers in late anthesis persisting.

W. side of Green River near Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7343a.*

OENOTHERACEAE

Epilobium adenocaulon Hausskn.

Common throughout the Basin in wet places of low and mid-altitudes. The specimens show flowers and fruit, except *Graham 9424* and *9651*, which show flowers only, and *Graham 7414* which shows only fruit.

Dry Fork, in Juniper Zone, 7000 ft., June 27, 1931, *Graham 6407;* along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7414;* Davis Hollow, Taylor Mt., 8700 ft., Sept. 7, 1931, *Graham 7474;* between U ranch and sheep bridge, Uinta River, 8300 ft., July 23, 1933, *Graham 8621;* along road, Red Creek valley, 7500 ft., June 26, 1935, *Graham 9424;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9900a;* W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9651;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9804;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Epilobium adenocaulon Hausskn. var. **occidentale** Trelease

The single specimen cited, collected along a stream on the southernmost extension of the Tavaputs Plateau, shows both flowers and fruit.

Post Canyon, 7800 ft., July 28, 1935, *Graham 9860.*

Epilobium alpinum L. ALPINE WILLOW HERB

This arctic-alpine Eurasian species is infrequent throughout the Basin in wet meadows and along stream banks of upper altitudes. All of the specimens show flowers and various stages of maturing fruit; *Graham 10247* is questionably determined.

In pine woods, E. of Paradise Park, 10,000 ft., July 4, 1933, *Graham 8376;* meadow above Chain Lakes, SE. slope of Mt. Emmons, 11,000 ft., July 20, 1933, *Graham 8555;* Willow Springs, 9300 ft., July 10,

1935, *Graham 9575;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10247.*

Epilobium anagallidifolium Lam.

This arctic-alpine Eurasian species is infrequent in the Uinta Mts. in wet places of upper altitudes, especially near and above tree line. Both specimens show flowers and maturing capsules.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6611;* N. of Robert's Pass, NE. slope of Mt. Emmons, 11,300 ft., July 20, 1933, *Doutt s. n.*

Epilobium angustifolium L. FIREWEED

Frequent throughout the Basin in woodlands of mid- and upper altitudes, where it usually occurs on burned-over areas. *Graham 6493* and *6501* are in bud; *Graham 9682* and *9909* are in flower; the remaining specimens show both flowers and maturing capsules.

W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6493*, *Graham 6501;* between sheep bridge, Uinta River and Chain Lakes, 9000 ft., July 23, 1933, *Graham 8638;* W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9682;* ridge between Post and Florence Canyons, 8200 ft., July 29, 1935, *Graham 9909;* head of Hill Creek, 8500 ft., July 31, 1935, *Graham 9934;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10240;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Epilobium clavatum Trel.

The following specimen is in the herbarium of F. J. Hermann at Ann Arbor, Michigan: bank of streamlet above timber line, SE. slope of Mt. Emmons, 11,340 ft., July 19, 1933, *Hermann 5024* (also in Mo. Bot. Gard., Gray Herb., Univ. Wyo., and U. S. Nat. Herb.).

Epilobium Hornemannii Reichenb.

This arctic-alpine Eurasian species is infrequent in wet meadows at high altitudes in the Uinta Mts. near timber line. All of the specimens show flowers and fruit; *Graham 8534* is questionably determined.

Meadow above Chain Lakes, SE. slope of Mt. Emmons, 11,000 ft., July 20, 1933, *Graham 8534;* near third Chain Lake, 11,000 ft., July 21, 1933, *Graham 8588;* Chepeta Lake, 10,600 ft., Aug. 21, 1935, *Graham 10101.*

Epilobium rubescens Rydb.

The following specimens of this species are situated as indicated: timber line, above Chain Lakes, 11,300 ft., July 18, 1933, *Hermann 4961* (in Phil. Acad.); dry, rocky shore of fourth Chain Lake, 11,200 ft., July 20, 1933, *Hermann 5109* (in herbarium of F. J. Hermann at Ann Arbor, Michigan, Mo. Bot. Gard., Gray Herb., and Univ. Wyo.).

Epilobium saximontanum Hausskn.

Frequent at mid- and upper altitudes throughout the Basin. The specimens are all in flower.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6420;* Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6569*, *Graham 6587;* SW. of Moon Lake, 8100 ft., June 24, 1935, *Graham 9359;* E. tributary of Red Creek, 7500 ft., June 26, 1935, *Graham 9399;* Willow Springs, 9200 ft., July 11, 1935, *Graham 9591.*

Gayophytum lasiospermum Greene var. **typicum** Munz

Gayophytum lasiospermum Greene

The single specimen cited, collected on the southernmost extension of the Tavaputs Plateau, shows both flowers and mature capsules.

For studies in the Oenotheraceae relating to this and the following genera, see Philip A. Munz, Am. Journ. Bot. **15**: 223. 1928 et. seq., and Bot. Gaz. **85**: 233. 1928.

Post Canyon, 8000 ft., July 27, 1935, *Graham 9833.*

Gayophytum racemosum T. and G.

The specimens cited, one collected on the south slope of the Uinta Mts., and the other on the Tavaputs Plateau, show flowers with very immature capsules, and are therefore somewhat questionably determined.

Near Little Lake, 8300 ft., June 23, 1933, *Graham 8268;* meadow-pasture NW. of Willow Springs, 9600 ft., July 10, 1935, *Graham 9562.*

Gayophytum ramosissimum T. and G.

The single specimen cited is in flower.

Junction of Juniper and Aspen Zones, Uinta River Canyon, 7000 ft., June 2, 1933, *Graham 8057a.*

Oenothera breviflora T. and G.

Taraxia breviflora Nutt.

The single specimen cited, collected in the extreme west end of the Basin, is in flower.

S. end of Strawberry reservoir, 7500 ft., June 19, 1935, *Graham 9289*.

Oenothera caespitosa Nutt. var. **Jonesii** Munz See Am. Journ. Bot. **18**: 731. 1931.

This eastern Utah endemic is infrequent at low altitudes in the Uinta Basin. *Graham 6116* is in fruit; the other specimens are in flower, with *Peterson s. n.* showing capsules also. *Graham 8824* and *Peterson s. n.* are atypical, the latter being scarcely hairy enough for var. *Jonesii*.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6096*, *Graham 6116;* S. slope of Leland Bench, 5000 ft., May 13, 1935, *Graham 8824;* Uinta Basin, July 12, 1912, *Peterson s. n.*

Oenothera caespitosa Nutt. var. **marginata** (Nutt.) Munz

Oenothera marginata Nutt.

Pachylophus marginatus Rydb.

The single specimen cited, collected in the west end of the Basin, is in flower.

E. tributary of Red Creek, 7500 ft., June 26, 1935, *Graham 9391*.

Oenothera caespitosa Nutt. var. **montana** (Nutt.) Durand

Oenothera montana Nutt.

Pachylophus montanus A. Nels.

Frequent throughout the Basin at low altitudes. All of the specimens are in flower, with the late May and June numbers showing capsules also. The first specimen cited (*Graham 6345*), which shows both flowers and capsules, represents an intermediate variety. Dr. Munz writes that it is "with leaves of var. *montana* (Nutt.) Durand and with fruits of var. *Jonesii* Munz."

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6345;* along N. slope of Green River, 9 mi. SSE. of Vernal, 5000 ft., April 27, 1933, *Graham 7534;* hills E. of Dinosaur Quarry, 5000 ft., April 29, 1933, *Graham 7570;* bad lands N. of Skull Pass Quarry, 5000 ft., May 9, 1933, *Graham 7636;* W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7937;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9075*.

Oenothera contorta Dougl. var. **flexuosa** (Nels.) Munz

Sphaerostigma contortum var. *flexuosum* Nels.
Sphaerostigma flexuosum (Nels.) Rydb.

Infrequent at low altitudes. The specimens all show flowers and maturing capsules, except *Graham 7739*, which exhibits flowers only.

Between Dinosaur Quarry and Green River, 4800 ft., May 19, 1933, *Graham 7739;* junction of Juniper and Aspen Zones, Uinta River Canyon, 7000 ft., June 2, 1933, *Graham 8057;* Greasewood flat, above marsh, mouth of Ashley Creek, 4700 ft., May 30, 1935, *Graham 9019;* Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9142.*

Oenothera coronopifolia T. and G.

Collected only at mid-altitudes on the Tavaputs Plateau. The specimens all show flowers and young capsules.

W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9679;* middle fork of Stuart Creek, Colo., 7000 ft., July 19, 1935, *Graham 9777;* Post Canyon, 8000 ft., July 29, 1935, *Graham 9919.*

Oenothera heterantha Nutt.

Oenothera subacaulis Garrett
Taraxia heterantha (Nutt.) Small
Taraxia subacaulis Rydb.

The single specimen cited, collected in the extreme west end of the Basin, is in flower.

Horse Creek, 7700 ft., June 18, 1935, *Graham 9243.*

Oenothera Hookeri T. and G.

The single specimen cited was collected in a deep canyon near the Basin's southern rim; it shows flowers and maturing capsules.

Along creek, Florence Canyon, 5500 ft., Aug. 1, 1935, *Graham 9961.*

Oenothera lavandulaefolia T. and G. var. **glandulosa** Munz

Infrequent at mid-altitudes throughout the Basin. All the specimens are in flower.

Juniper Zone below Moon Lake, 7500 ft., June 30, 1931, *Graham 6412;* under Pinyons at pass, head of Smith Wells Draw, 7500 ft., June 28, 1933, *Graham 8323;* 2 mi. W. of Mountain Home, 7000 ft., June 25, 1935, *Graham 9368.*

Oenothera minor (Nels.) Munz var. **typica** Munz

Sphaerostigma minus (given as *minor*) Nels.

Infrequent at low altitudes. The specimens show flowers in various stages of anthesis.

Between Dinosaur Quarry and Green River, 4800 ft., May 19, 1933, *Graham 7741*, *Graham 7743;* talus slope, S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7871;* Greasewood flat, above marsh, mouth of Ashley Creek, 4700 ft., May 30, 1935, *Graham 9016.*

Oenothera pallida Lindl. var. **typica** Munz

Anogra leptophylla Rydb.
Anogra pallida Britt.
Oenothera pallida Lindl.

The single specimen cited shows flowers and maturing capsules.

Dry Fork, in Juniper Zone, 7000 ft., June 26, 1931, *Graham 6391.*

Oenothera Rydbergii House

Oenothera biennis var. *canescens* T. and G., not T. and Frém.
Oenothera strigosa Mack. and Bush, not Willd.

The single specimen cited shows flowers and matured capsules; it is tentatively determined.

Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7370.*

Oenothera scapoidea Nutt. var. **typica** Munz

Chylismia scapoidea (Nutt.) Small

Common throughout the Basin at low altitudes, occurring in a great variety of soils, such as clay, sand, and rocky talus. All of the specimens show flowers and maturing capsules except *Graham 7619* and *8796*, which show only flowers, and *Peterson s. n.* (July 15) which shows only ripened capsules.

Skull Pass Quarry, 5000 ft., May 6, 1933, *Graham 7619;* bad lands N. of Skull Pass Quarry, 5000 ft., May 9, 1933, *Graham 7649;* Douglass Canyon, W. of Dinosaur Quarry, 5000 ft., May 19, 1933, *Graham 7727;* Skull Pass Quarry, 5000 ft., May 18, 1933, *Graham 7825*, *Graham 7831a;* Pariette Mine, 10 mi. SE. of Myton, 5000 ft., May 26, 1933, *Graham 7864;* talus slope, S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7877;* Ouray-Bonanza road 14 mi. E. of Ouray, 4800 ft., May 9, 1935, *Graham 8796;* bench W. of Green River, S. of Uteland Mine, 4800 ft., May 16, 1935, *Graham 8878;* E. of Dinosaur

Quarry, May 29, 1912, *Peterson s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.;* Uinta Basin, July 15, 1912, *Peterson s. n.*

Oenothera scapoidea Nutt. var. **serosa** (A. Nels.) Munz

Chylismia scapoidea var. *serosa* A. Nels.

Infrequent at low altitudes. *Graham 6100* shows flowers and ripened capsules; *Graham 9310* exhibits only ripened fruits.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6100;* desert 5 mi. E. of Lapoint, 5700 ft., June 22, 1935, *Graham 9310.*

Oenothera trichocalyx Nutt.

Anogra trichocalyx (Nutt.) Small

Common in rather rocky places of low altitude zones in the north half of the Basin. The specimens are in flower, with *Graham 6183, 6295, 7848* and the Douglass and Peterson specimens, excepting that of June 9, showing maturing capsules as well.

Flat between Ouray and Quarry "L," 4700 ft., June 21, 1931, *Graham 6183;* along road S. of Vernal, 5000 ft., June 23, 1931, *Graham 6295;* Skull Pass Quarry, 5000 ft., May 18, 1933, *Graham 7826;* Pariette Mine, 10 mi. SE. of Myton, 5000 ft., May 26, 1933, *Graham 7848;* bench, head of Sand Wash, 5300 ft., May 30, 1933, *Graham 7968;* junction of Juniper and Aspen Zones, Uinta River Canyon, 7000 ft., June 2, 1933, *Graham 8050;* S. slope of Leland Bench, 5000 ft., May 14, 1935, *Graham 8844;* rocky slope, W. side of Duchesne River, 4 mi. above Ouray, 4800 ft., May 15, 1935, *Graham 8866;* Leota road near Highway US. 40, 15 mi. SW. of Vernal, 5000 ft., May 21, 1935, *Graham 8920;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 10010;* Dry Run, Red Bluff Wash on Dragon-Vernal road between White and Green Rivers, June 27, 1908, *Douglass s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.;* White River, June 26, 1912, *Peterson s. n.;* Ainge Gulch, W. of Dinosaur Quarry, June 17, 1912, *Douglass s. n.*

HIPPURIDACEAE

Hippurus vulgaris L. MARE'S TAIL

In the Uinta Basin this Eurasian species is infrequent in swamps of low altitude. The May specimen is in flower; the June specimen shows mature fruit.

Marsh, mouth of Ashley Creek, 4750 ft., May 30, 1935, *Graham*

9008; marsh along road, N. side of Strawberry River, 5 mi. below mouth of Red Creek, 6100 ft., June 19, 1935, *Graham 9278.*

UMBELLIFERAE

Angelica Lyallii S. Wats.

The single specimen cited, collected in the Uinta Mts. near the timber line, is in flower.

Above third Chain Lake, 11,000 ft., July 21, 1933, *Graham 8576.*

Angelica pinnata S. Wats.

The single specimen cited (consisting of two sheets, "a" and "b") was collected on the southernmost extension of the Tavaputs Plateau; it shows both flowers and immature fruit.

Post Canyon, 7800 ft., July 28, 1935, *Graham 9864.*

Angelica Roseana Henderson

Infrequent at mid- and upper altitudes in the Uinta Mts. Both specimens cited show flowers, and *Graham 6565* shows immature fruit also.

Up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6565;* between sheep bridge, Uinta River, and Chain Lakes, 10,000 ft., July 23, 1933, *Graham 8641.*

Berula erecta (Huds.) Coville WATER PARSNIP

The single specimen cited, showing flowers and immature fruit, was collected near the edge of an extensive Scirpus-Typha swamp.

Marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9814.*

Cicuta occidentalis Greene WATER HEMLOCK

An infrequent plant throughout the Basin in moist places, as along streams and ditchbanks at low altitude, especially in the vicinity of cultivation. The early specimens show flowers and developing fruit; the September number exhibits mature fruit. It has small white flowers in umbel-like clusters and divided leaves and is a very poisonous plant which is sometimes mistaken for garden parsnip. It is differentiated from its close relatives by the cross partitions in the tuber-like roots. The entire plant, but particularly the roots, are fatal to stock and to people who eat them. Large numbers of stock are probably not lost through poisoning by this plant, but it should be

avoided by both man and stock, as small quantities of it cause death in a very short time.

W. side of Green River near Quarry "L," 4700 ft., June 22, 1931, *Graham 6200;* along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7411;* along road between Vernal and Myton, 5500 ft., June 28, 1933, *Graham 8335;* Uinta River W. of Lapoint, 5700 ft., July 23, 1933, *Graham 8608.*

Cogswellia Grayi Coult. and Rose

Cogswellia millefolium (Wats.) Jones
Lomatium Grayi C. and R.
Lomatium millefolium (Wats.) Macbr.
Peucedanum Grayi C. and R.
Peucedanum millefolium Wats.

A frequent species throughout the Basin at low or mid-altitudes. *Graham 9115* is in fruit; the other specimens are in flower with immature fruit also on *Graham 8013.*

Sand hills, out Maeser road, 6000 ft., May 2, 1933, *Graham 7593;* Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7805;* Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8013;* head of Deep Channel Creek, Colo., 6400 ft., June 4, 1935, *Graham 9115.*

Cogswellia juniperina Jones

Lomatium juniperinum (Jones) C. and R.
Peucedanum juniperinum Jones

Infrequent throughout the Basin at mid-altitudes. Both specimens show flowers, with fruit also on the July number.

Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8031* (with *Cogswellia nevadensis*); Willow Springs, 9550 ft., July 10, 1935, *Graham 9577.*

Cogswellia macrocarpa (H. and A.) Jones

Ferula macrocarpa H. and A.
Lomatium macrocarpum (Nutt.) C. and R.
Peucedanum macrocarpum Nutt.

The single specimen cited, which shows both flowers and fruit, is from the eastern end of the Basin.

S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5700 ft., June 2, 1935, *Graham 9095.*

Cogswellia nevadensis (Wats.) Jones

Lomatium nevadense (Wats.) C. and R.
Peucedanum nevadense Wats.
Peucedanum nudicale Wats., not Nuttall

The single specimen cited, collected on the south slope of the Uinta Mts., is in flower with immature fruit.

Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7811* (see also *Cogswellia juniperina, Graham 8031*).

Cogswellia nevadensis Parishii (Coult. and Rose) Jones

Cogswellia Parishii C. and R.
Lomatium Parishii C. and R.
Peucedanum Parishii C. and R.

The single specimen cited, which shows both flowers and fruit, was collected in the eastern end of the Basin. The variety is here reported from Colorado for the first time, thus extending its range considerably eastward.

S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6000 ft., May 31, 1935, *Graham 9033*.

Cogswellia platycarpa (Torr.) Jones

Cogswellia simplex (Nutt.) Jones
Lomatium platycarpum (Torr.) C. and R.
Lomatium simplex (Nutt.) Macbr.
Peucedanum triternatum var. *platycarpum* Torr.
Peucedanum simplex Nutt.

Frequent throughout the Basin at mid- or occasionally low altitudes. The specimens show the species flowering in May and maturing fruit in June.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6344, Graham 6365;* Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7810;* Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8035;* near Little Lake, 8500 ft., June 22, 1933, *Graham 8229;* NE. end of Calamity Ridge, S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6000 ft., May 31, 1935, *Graham 9066*.

Cymopterus acaulis (Pursh) Raf.

Cymopterus glomeratus (Nutt.) Raf.
Cymopterus Leibergii Coult. and Rose
Cymopterus lucidus Osterh.
Cymopterus Parryi (Coult. and Rose) Jones
Selinum acaule Pursh

Very common throughout the Basin at low altitudes. The specimens cited show the species flowering in April and early May, and maturing fruit in late May and June. The present collections represent the first record of the species from Utah (See Ann. Mo. Bot. Gard. **17**: 384. 1930) and an extension of its range to the southwest. It is one of the earliest spring flowers in the Basin.

5 mi. NW. of Dinosaur Quarry, 5500 ft., April 24, 1933, *Graham 7517;* 9 mi. SSE. of Vernal, 5000 ft., April 27, 1933, *Graham 7531;* Douglass Canyon, W. of Dinosaur Quarry, 5000 ft., April 28, 1933, *Graham 7552;* hills E. of Dinosaur Quarry, 5000 ft., April 29, 1933, *Graham 7574;* flat SE. of Jensen, 5000 ft., May 5, 1933, *Graham 7600;* bad lands N. of Skull Pass Quarry, 5000 ft., May 9, 1933, *Graham 7642;* hills E. of Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7697;* talus slope, S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7889;* bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7911*, *Graham 7923;* 9 mi. SSE. of Vernal, 5000 ft., May 2, 1935, *Graham 8744;* W. side of Green River near Quarry "L," 4700 ft., May 4, 1935, *Graham 8755*, *Graham 8756;* N. side of White River, 4 mi. NE. of mouth of Evacuation Creek, 5300 ft., May 7, 1935, *Graham 8778;* Ouray-Bonanza road 14 mi. E. of Ouray, 4800 ft., May 9, 1935, *Graham 8798;* along Vernal-Lapoint road W. of Asphalt Ridge, 5800 ft., May 11, 1935, *Graham 8805;* Leland Bench SE. of Myton, 5000 ft., May 13, 1935, *Graham 8833;* near Uteland Mine, 4800 ft., May 17, 1935, *Graham 8898;* NE. of Dinosaur Quarry, May 30, 1912, *Peterson s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Cymopterus bulbosus Nels. INDIAN POTATO

Phellopterus bulbosus (Nels.) Coult. and Rose
Phellopterus camporum Rydb.
Phellopterus utahensis (Jones) Wooton and Standl., in part

Common throughout the Basin at low altitudes. The specimens cited show the species flowering in April and early May and maturing fruit in late May. It is usually looked upon by the natives as the earliest spring flower in the region, and its enlarged roots have been used for food.

5 mi. NW. of Dinosaur Quarry, 5500 ft., April 25, 1933, *Graham 7522;* flat SE. of Jensen, 5000 ft., May 5, 1933, *Graham 7601;* bad lands N. of Skull Pass Quarry, 5000 ft., May 9, 1933, *Graham 7635;*

Pariette Mine, 10 mi. SE. of Myton, 5000 ft., May 26, 1933, *Graham 7857;* talus slope, S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7893;* 9 mi. SSE. of Vernal, 5000 ft., May 2, 1935, *Graham 8742;* W. side of Green River near Quarry "L," 4700 ft., May 4, 1935, *Graham 8757;* N. side of White River, 4 mi. NE. of mouth of Evacuation Creek, 5300 ft., May 8, 1935, *Graham 8785;* along Ouray-Bonanza road, 14 mi. E. of Ouray, 4800 ft., May 9, 1935, *Graham 8797;* S. slope of Leland Bench, 5000 ft., May 13, 1935, *Graham 8823;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6000 ft., May 31, 1935, *Graham 9046;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* flat, upland desert 4 mi. S. of Jensen, April 22, 1932, *Sweadner s. n.*

Cymopterus duchesnensis Jones

Aulospermum duchesnense (Jones) Tidestrom

Infrequent at low altitudes in the central Basin. The 1933 specimens are in flower; the other numbers show flowers and developing fruits. This Uinta Basin endemic was previously known only from the type locality (Myton, May 20, 1908 M. E. Jones).

N. of Skull Pass Quarry, 5000 ft., May 9, 1933, *Graham 7637;* Douglass Canyon, W. of Dinosaur Quarry, 5000 ft., May 19, 1933, *Graham 7732;* rocky slope, W. side of Duchesne River, 4 mi. above Ouray, 4800 ft., May 15, 1935, *Graham 8872;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.*

Cymopterus longipes Wats.

Aulospermum angustum Osterh.
Aulospermum longipes (Wats.) Coult. and Rose
Cogswellia lapidosa (Jones) Rydb.
Cymopterus lapidosus Jones
Lomatium lapidosum (Jones) Garrett

Common throughout the Basin at mid- or occasionally low altitudes, especially in Sagebrush areas. The specimens cited show the species flowering in May and maturing fruit in June.

Asphalt Ridge, SW. of Vernal, 6000 ft., May 1, 1933, *Graham 7580;* sand hills, out Maeser road, 6000 ft., May 2, 1933, *Graham 7586;* Cottonwood Springs, Little Mt., 6600 ft., May 22, 1933, *Graham 7785;* Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7812;* Uinta River Canyon, 7500 ft., June 2, 1933, *Graham 8068;* near Little Lake, 8300 ft., June 23, 1933, *Graham 8252;* SE. slope of Mosby

Mt., 8000 ft., July 3, 1933, *Graham 8347;* along Vernal-Lapoint road W. of Asphalt Ridge, 5800 ft., May 11, 1935, *Graham 8807;* Dry Fork Creek just above Dry Fork town, 6700 ft., May 12, 1935, *Graham 8817;* below Mud Springs, 8500 ft., June 29, 1935, *Graham 9493.*

Cymopterus planosus (Osterh.) Mathias

Aulospermum planosum Osterh.

The single specimen cited is in flower. The species is here reported from Utah for the first time; it was previously known only from northwestern Colorado.

Flat SE. of Jensen, 5000 ft., May 5, 1933, *Graham 7599.*

Cymopterus purpurascens (Gray) Jones

Phellopterus purpurascens (Gray) Coult. and Rose, emend. Mathias See Ann. Mo. Bot. Gard. **17**: 370. 1930.

Cymopterus utahensis Jones

Phellopterus utahensis (Jones) Wooton and Standl., in part

Both specimens cited are in fruit and were collected in sand-gravel soil of the Mixed Desert Shrub Zone.

9 mi. SSE. of Vernal, 5000 ft., April 27, 1933, *Graham 7530;* 9 mi. SSE. of Vernal, 5000 ft., May 2, 1935, *Graham 8743.*

Cymopterus purpureus Wats.

Aulospermum purpureum (Wats.) Coult. and Rose

Coriophyllus purpureus (Wats.) Rydb.

Frequent throughout the central Basin at low altitudes. The specimens cited show the species flowering in April and early May and maturing fruit in late May and June.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6286;* 9 mi. SSE. of Vernal, 5000 ft,. April 27, 1933, *Graham 7529;* hills E. of Dinosaur Quarry, 5000 ft., April 29, 1933, *Graham 7565;* 5 mi. NW. of Dinosaur Quarry, 5500 ft., May 16, 1933, *Graham 7673;* hills E. of Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7696;* along Vernal-Lapoint road W. of Asphalt Ridge, 5800 ft., May 11, 1935, *Graham 8808;* E. side of Green River, Island Park, 5000 ft., June 11, 1935, *Graham 9195.*

Ligusticum Porteri Coult. and Rose

Common throughout the Basin at mid-altitudes. The June and early July specimens are in flower; the mid-July to August numbers show varying stages of maturing fruit.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6351;* SE. slope of Mosby Mt., 8000 ft., July 3, 1933, *Graham 8343;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9478;* Willow Springs, 9550 ft., July 10, 1935, *Graham 9549;* W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9674;* middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9740;* head of Hill Creek, 8500 ft., July 31, 1935, *Graham 9945;* Bitter Creek, 3 mi. E. of Utah-Colorado state line, 7800 ft., Aug. 30, 1935, *Graham 10167.*

Ligusticum tenuifolium Wats.

Frequent at upper altitudes throughout the Uinta Mts., up to timber line, especially in wet meadow patches. All of the specimens show flowers, with various stages of fruit also on *Graham 10051* and *10222*, and *Doutt 4346.*

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6567;* along stream above Chain Lakes, 11,000 ft., July 20, 1933, *Graham 8537;* Paradise Park, 10,000 ft., Aug. 16, 1935, *Graham 10051;* Chepeta Lake, 10,600 ft., Aug. 20, 1935, *Graham 10075;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10222;* Petty Mt., 15 mi. N. of Mountain Home, 10,000 ft., Aug. 22, 1936, *Doutt 4346.*

Osmorhiza divaricata Nutt.

Washingtonia divaricata Britton

Boggy bank of streamlet in dense Aspen-Spruce woods, near bridge over Uinta River on trail to Chain Lakes, 8500 ft., July 23, 1933, *Hermann 5249* (specimens in the herbarium of Frederick J. Hermann, Gray Herbarium, U. S. National Herbarium, and Missouri Botanical Garden).

Osmorhiza obtusa (Coult. and Rose) Fernald

Washingtonia obtusa Coult. and Rose

Frequent throughout the Basin at mid-altitudes, especially in Aspen woodland. The June specimens show some flowers; otherwise the specimens exhibit varying stages of maturing fruits, the August numbers being old plants.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6309;* W. side of Uinta River at sheep bridge, 8500 ft., July 23, 1933, *Graham 8625;* Horse Creek, 7700 ft., June 18, 1935, *Graham 9260;* Rock Creek, near Willow Springs, 9200 ft., July 11, 1935, *Graham 9599;* West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham*

9660; on Cottonwood flood-plain, Florence Canyon, 6000 ft., Aug. 1, 1935, *Graham 9960;* one mi. W. of Baxter Pass, Colo., 8300 ft., Aug. 29, 1935, *Graham 10155.*

Osmorhiza occidentalis (Nutt.) Torr.

Glycosma occidentalis Nutt.
Washingtonia occidentalis (Nutt.) Coult. and Rose

The single specimen cited, which shows flowers and very young fruit, was collected in the extreme west end of the Basin.

Head of Horse Creek, 7800 ft., June 17, 1935, *Graham 9229.*

Pastinaca sativa L. WILD PARSNIP

This European introduction was collected only in moist areas near cultivation. The July specimen shows flowers and fruit; the later numbers show fruit only.

This plant is sometimes confused with Water Hemlock, *Cicuta occidentalis.* However, it is not considered poisonous to stock and may be told from Cicuta by its yellow flowers and absence of cross partitions in the roots.

Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7375;* along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7412;* along Uinta River W. of Lapoint, 5700 ft., July 23, 1933, *Graham 8614.*

Pseudocymopterus Hendersonii Coult. and Rose, emend. Mathias

See Ann. Mo. Bot. Gard. **17**: 321. 1930.

Pseudocymopterus anisatus (Gray) Coult. and Rose
Pseudopteryxia anisata (Gray) Rydb.
Pseudopteryxia Hendersonii (Coult. and Rose) Rydb.
Pseudopteryxia longiloba Rydb.

Collected only in the Uinta Mts. in the vicinity of timber line. *Graham 8435* is in flower; the other specimens show maturing fruit.

Ridge NNW. of Paradise Park, 11-11,500 ft., July 8, 1933, *Graham 8435;* ridge NNW. of Paradise Park, 11,000 ft., July 8, 1933, *Graham 8444;* meadow above trees, N. of Chain Lakes, 11,400 ft., July 20, 1933, *Graham 8566.*

Pseudocymopterus montanus (Gray) Coult. and Rose

Thaspium (?) *montanum* Gray

Rocky slope above fourth Chain Lake, [11,300 ft.], July 19, 1933,

Hermann 5070 (specimens in the herbarium of Frederick J. Hermann at Ann Arbor, Michigan, Gray Herbarium, U. S. National Herbarium, and Missouri Botanical Garden).

Pteryxia terebinthina var. **calcarea** (Jones) Mathias

Cymopterus calcareus Jones
Pteryxia calcarea (Jones) Coult. and Rose

Frequent throughout the central Basin at low altitudes. The April and May specimens show flowers; the June numbers are in fruit.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6272;* 5 mi. NW. of Dinosaur Quarry, 5500 ft., April 24, 1933, *Graham 7527;* N. of Dinosaur Quarry, 5500 ft., May 18, 1933, *Graham 7712;* Cottonwood Springs, Little Mt., 6600 ft., May 22, 1933, *Graham 7767;* 9 mi. SSE. of Vernal, 5000 ft., May 2, 1935, *Graham 8747;* Red Wash, above Island Park, 5100 ft., June 10, 1935, *Graham 9152;* NE. of Dinosaur Quarry, May 30, 1912, *Peterson s. n.*

CORNACEAE

Cornus instolonea A. Nels. See Bot. Gaz. **53**: 224. 1912.

DOGWOOD

Svida instolonea (A. Nels.) Rydb.
Svida stolonifera riparia Rydb.

An infrequent species throughout the Basin at low and mid-altitudes, always found along well watered stream and river banks, usually among a growth of other shrubs about head high. It was also collected (*Graham 8102*) in Jackson Draw on the north slope of the Uinta Mts. The leaves in our specimens are all more or less elliptic and less than 6 cm. long. *Graham 6236* is in bud; *Graham 6505, 6509,* and *9370* show flowers; the remaining specimens exhibit various stages of maturing fruit.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6236;* Dry Fork, in Juniper Zone, 7000 ft., June 26, 1931, *Graham 6384;* W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6505, Graham 6509;* E. bank of Green River, Island Park, 4950 ft., June 11, 1935, *Graham 9186;* ridge just below Moon Lake, 8000 ft., June 25, 1935, *Graham 9370;* on Cottonwood flood-plain, Florence Canyon, 6000 ft., Aug. 1, 1935, *Graham 9962;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 9989.*

PYROLACEAE

Pyrola chlorantha Swartz SHINLEAF

Both specimens of this north European species cited were collected at mid-altitude on the south slope of the Uinta Mts.; both are in flower with old fruits also on the June number.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6430;* between sheep bridge, Uinta River and Chain Lakes, 9500 ft., July 23, 1933, *Graham 8642.*

Pyrola secunda L.

Ramischia secunda (L.) Garcke

The following specimen is in the herbarium of the Missouri Botanical Garden: near sheep bridge over Uinta River, boggy bank of streamlet in dense Aspen-Spruce woods, 8500 ft., July 23, 1933, *Hermann 5251.*

Pyrola uliginosa Torr.

Pyrola rotundifolia incarnata A. Gray

Frequent at mid-altitudes in the Uinta Mts. *Graham 6506* and *9338* are in bud, the former with old capsules also. *Graham 8630* and *Douglass s. n.* are in flower; *Graham 8003* shows old capsules only.

W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6506;* Uinta River Canyon, above Big Park, 7500 ft., May 31, 1933, *Graham 8003;* W. side of Uinta River at sheep bridge, 8500 ft., July 23, 1933, *Graham 8630;* SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9338;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

ERICACEAE

Arctostaphylos nevadensis A. Gray SIERRA BEARBERRY

The following specimen of this species, apparently previously unreported from Utah, is in the herbarium of the Missouri Botanical Garden: dry, Aspen woods near sheep bridge, Uinta River, 8400 ft., July 23, 1933, *Hermann 5265.*

Arctostaphylos platyphylla (A. Gray) Kuntze MANZANITA

Fairly frequent but never abundant in mid-altitude woodland in the Uinta Mts. The May specimens are in flower; the later numbers show maturing fruit. Alice Eastwood (Leafl. West. Bot. 1: 118. 1934) considers this species to be scarcely separable from *A. patula* Greene.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6431;* W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6487, Graham 6490;* Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7989, Graham 8000;* between U ranch and sheep bridge, Uinta River Canyon, 8300 ft., July 23, 1933, *Graham 8619.*

Arctostaphylos Uva-ursi (L.) Spreng. BEARBERRY

This Eurasian species is frequent at mid- and upper altitudes in the Uinta Mts. The May specimens show flowers; the later numbers exhibit fruit. It is not believed necessary to subdivide this species into varieties on the basis of pubescence differences, as done by Fernald and Macbride (Rhodora **16**: 211. 1914).

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6457;* Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7799;* Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7990;* around third Chain Lake and cliff above, 11,000 ft., July 21, 1933, *Graham 8583;* SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9329;* Yellowstone (East Fork of Lake Fork) Creek, 12 mi. N. of Mountain Home, 7800 ft., Aug. 18, 1936, *Doutt 4336.*

Gaultheria humifusa (Graham) Rydb. WINTERGREEN

Gaultheria Myrsinites Hook.

Vaccinium humifusum Graham

Infrequent at upper altitudes in the Uinta Mts., where it is to be found on rocky exposed places, often around lakes. The July specimen is in flower; the September number is in fruit.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6574a;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10221;* (see also *Kalmia microphylla, Graham 8385*).

Kalmia microphylla (Hook.) Heller KALMIA, MOUNTAIN LAUREL

Frequent at upper altitudes in the Uinta Mts. It occurs in grassy, acid borders of streams and lakes. The July specimens show flowers and immature fruit; the September number exhibits matured capsules.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6574;* Blanchard Park, head of Dry Fork Creek, 10,000 ft., July 5, 1933, *Graham 8385* (with *Gaultheria humifusa*); between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 19, 1933, *Graham 8485;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10223.*

Ledum glandulosum Nutt. LABRADOR TEA

Head of Yellowstone, 11,000 ft., Sept. 14, 1926, *Lambert and Nord 7*, USFS 54325 (vegetative specimen).

Pterospora andromeda Nutt. PINE-DROPS, GIANT BIRD'S-NEST

The single specimen cited, showing only fruit of the preceding season, was collected in aspen-pine woods in a canyon on the south slope of the Uinta Mts.

Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7998*.

Vaccinium caespitosum Michx. BLUEBERRY or ROCKY MOUNTAIN WHORTLEBERRY

Vaccinium Myrtillus Hook., not L.

Vaccinium oreophilum Rydb.

Infrequent in upper altitude woodlands and meadows in the Uinta Mts. The specimens are all in anthesis.

E. of Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8179;* meadow along stream above Chain Lakes, 11,000 ft., July 20, 1933, *Graham 8523;* near third Chain Lake, 11,000 ft., July 21, 1933, *Graham 8584*.

Vaccinium globulare Rydb. BLUEBERRY

The following specimen is in the herbarium of the Missouri Botanical Garden: dry Spruce woods, E. slope of fourth Chain Lake, 11,200 ft., July 21, 1933, *Hermann 5193*.

Vaccinium occidentale A. Gray WESTERN BOG BLUEBERRY

Infrequent in upper altitude woodlands and meadows of the Uinta Mts. *Graham 6617* is vegetative, *8600* in flower and *10233* in fruit.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6617;* W. side of second and third Chain Lakes, 10,700 ft., July 22, 1933, *Graham 8600;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10233*.

Vaccinium scoparium Leiberg GROUSE BERRY or GROUSE WHORTLEBERRY

Vaccinium erythrococcum Rydb.

Common in upper altitude forests in the Uinta Mts. For the most part the June specimens are in flower; the July numbers show immature, the later specimens mature, fruit. Although low in height, this species is considered the dominant undershrub in Lodgepole Pine forests, where it sometimes covers the ground in solid stands to the exclusion of other species.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6570*, *Graham 6615;* Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8178;* WNW. of Trout Creek Ranger Station, 10,000 ft., June 21, 1933, *Graham 8208*, *Graham 8210;* W. side of second and third Chain Lakes, 10,700 ft., July 22, 1933, *Graham 8597;* woods, NE. of Paradise Park, 10,000 ft., Aug. 16, 1935, *Graham 10042;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10241.*

PRIMULACEAE

Androsace septentrionalis L.

This Eurasian species is common in rather dry, stony situations at mid- and upper altitudes throughout the Basin. Most of the May and June numbers show flowers while the July specimens exhibit developing capsules; only the September number, however, possesses matured fruit. This species is here not divided into its several segregates and is not considered distinct from *A. pinetorum* Greene, nor from *A. subumbellata* (A. Nels.) Small, which latter seems to be only an alpine form of *A. septentrionalis.* Some of the specimens, including *Graham 6598*, *8499*, and *10250*, which were collected above 10,000 ft., grade into the alpine *A. subumbellata.*

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6310;* S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6418;* Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6598;* Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7795;* Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7969;* Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8032;* meadow below Trout Creek Ranger Station, 9000 ft., June 22, 1933, *Graham 8233;* between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 19, 1933, *Graham 8499;* burned-over slope of Calamity Ridge, S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6500 ft., June 1, 1935, *Graham 9067;* Horse Creek, 7700 ft., June 18, 1935, *Graham 9242;* Willow Springs, 9600 ft., July 10, 1935, *Graham 9579;* Rock Creek, 9300 ft., July 11, 1935, *Graham 9614a;* along road near Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10250.*

Dodecatheon alpinum (A. Gray) Greene ALPINE SHOOTING STAR

Occasional at upper altitudes near timber line in the Uinta Mts. All of the specimens are in flower.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6621;* Paradise

Park, 10,000 ft., Aug. 16, 1935, *Graham 10049;* N. of Robert's Pass, NE. slope of Mt. Emmons, 11,300 ft., July 20, 1933, *Doutt s. n.*

Dodecatheon pauciflorum (Durand) Greene SHOOTING STAR
AMERICAN COWSLIP, BIRD-BILLS

Frequent at low and mid-altitude moist places. All of the specimens are in flower with *Graham 7655* showing old capsules also. *Graham 8066* is a white-flowered form which was growing in a large colony of the normal, purple-flowered forms represented by *Graham 8065.*

3 mi. W. of Dinosaur Quarry, 5500 ft., May 15, 1933, *Graham 7655;* Split Mt. Canyon, 5000 ft., May 25, 1933, *Graham 7831c;* Uinta River Canyon, 7500 ft., June 2, 1933, *Graham 8065, Graham 8066;* wet meadow, near Little Lake, 8500 ft., June 22, 1933, *Graham 8221.*

Dodecatheon radicatum Greene SHOOTING STAR
Dodecatheon multiflorum Rydb.

The single specimen cited is somewhat tentatively assigned to this species. It is in fruit with a short capsule and a few old flowers which show a distinct, though short, staminal tube, and somewhat rugose filaments and connectives.

Brush Creek Gorge, 6200 ft., Aug. 11, 1935, *Graham 10020.*

Primula Parryi A. Gray PRIMROSE, COWSLIP

Frequent in moist meadows along streams in upper altitudes of the Uinta Mts., often above timber line. The specimens are in flower except the August number which is in fruit.

Slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6628;* Blanchard Park, head of Dry Fork Creek, 10,000 ft., July 5, 1933, *Graham 8387;* in meadow, E. slope of Mt. Emmons, 11,300 ft., July 19, 1933, *Graham 8513;* West Fork of Whiterocks River, 11,600 ft., Aug. 21, 1935, *Graham 10121.*

OLEACEAE

Fraxinus anomala Torr. SINGLELEAF ASH

Scarce in the Basin where it was collected in small, sandy side draws entering the Green River. Our specimens represent the northernmost limit of the range of the species; it seems that its distribution within the Basin is due to the course of entry from the south made possible by the Green River channel. The May, 1933, numbers show leafless twigs and samaras of the preceding season; the Peterson specimens are

in late anthesis; *Graham 9968* shows leafy twigs with mature fallen samaras of the present season.

Hills E. of Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7686, Graham 7687;* in side wash, Desolation Canyon of Green River between Florence and Chandler Canyons, 4500 ft., Aug. 2, 1935, *Graham 9968;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* NE. of Dinosaur Quarry, May 30, 1912, *Peterson s. n.*

Fraxinus coriacea S. Wats.

The following specimen is in the herbarium of F. J. Hermann at Ann Arbor, Michigan: Vernal, July 26, 1933, *Hermann 5288.*

GENTIANACEAE

Frasera speciosa Dougl. DEER'S TONGUE, GREEN GENTIAN

Tessaranthium speciosum (Dougl.) Rydb.

Frequent throughout the Basin at mid- or occasionally upper altitudes. All of the specimens are in flower except the September number which shows matured capsules.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6350;* Davis Hollow, Taylor Mt., 8700 ft., Sept. 7, 1931, *Graham 7471;* near Little Lake, 8000 ft., June 23, 1933, *Graham 8245;* rocky slope E. of Paradise Park, 10,200 ft., July 6, 1933, *Graham 8407;* E. rim of Range Creek, near Willow Springs, 9500 ft., July 12, 1935, *Graham 9617.*

Gentiana affinis Griseb.

Dasystephana affinis (Griseb.) Rydb.

The single specimen cited is in flower.

Along Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7373.*

Gentiana calycosa Griseb.

The following specimen is in the herbarium of the Missouri Botanical Garden: grassy edge of moraine, SE. slope of Mt. Emmons, 11,300 ft., July 19, 1933, *Hermann 5049.*

Gentiana Fremontii Torr.

Chondrophylla Fremontii (Torr.) A. Nels.

Occasional in wet meadows near and above timber line in the Uinta Mts. All of the specimens cited are in flower.

E. slope of Mt. Emmons, 11,300 ft., July 20, 1933, *Graham 8517;* along stream above Chain Lakes, 11,000 ft., July 20, 1933, *Graham 8524;* head of West Fork of Whiterocks River, 11,600 ft., Aug. 21, 1935, *Graham 10110.*

Gentiana heterosepala Engelm.

Amarella heterosepala (Engelm.) Greene

Occasional at mid-altitudes. Both specimens cited are in flower.

Between U ranch and sheep bridge over Uinta River, 8300 ft., July 23, 1933, *Graham 8618;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.* (with *Gentiana plebeia*).

Gentiana monantha A. Nels.

Amarella monantha (A. Nels.) Rydb.

Occasional in meadow patches of the Alpine Zone of the Uinta Mts. The July specimen is in flower; the August number shows both flowers and mature capsules.

E. slope of Mt. Emmons, 11,300 ft., July 20, 1933, *Graham 8516;* head of West Fork of Whiterocks River, 11,600 ft., Aug. 21, 1935, *Graham 10113.*

Gentiana Parryi Engelm.

Dasystephana Parryi (Engelm.) Rydb.

Infrequent in meadows of upper altitude in the Uinta Mts., sometimes above timber line. Both specimens cited are in flower.

Head of West Fork of Whiterocks River, 11,600 ft., Aug. 21, 1935, *Graham 10111;* edge of Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10238.*

Gentiana plebeia Cham.

Amarella plebeia (Cham.) Greene

The single specimen of this eastern Asiatic species cited, collected in the Uinta Mts., is in flower.

Meadow along stream above Chain Lakes, 11,000 ft., July 20, 1933, *Graham 8554.* (See also *Gentiana heterosepala, Douglass s. n.* and *Swertia palustris, Graham 8489* and *Doutt 4347*).

Gentiana Romanzovii Ledeb.

Dasystephana Romanzovii (Ledeb.) Rydb.

Gentiana frigida A. Gray, not Haenke

Infrequent in moist meadows of upper altitude in the Uinta Mts.,

sometimes above timber line. The early specimen is in bud; the August number is in flower.

Above trees, SE. slope of Mt. Emmons, 11,400 ft., July 20, 1933, *Graham 8563;* S. edge of Chepeta Lake, 10,600 ft., Aug. 20, 1935, *Graham 10071.*

Swertia palustris A. Nels.

Swertia scopulina Greene

Frequent in moist meadows of upper altitude in the Uinta Mts. *Graham 8489* is in bud; the other specimens are in flower, except *Graham 10102* which shows both flowers and mature capsules.

Between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 19, 1933, *Graham 8489* (with *Gentiana plebeia*); meadow below dam, Paradise Park, 10,000 ft., Aug. 16, 1935, *Graham 10050;* Chepeta Lake, 10,600 ft., Aug. 21, 1935, *Graham 10102;* Petty Mt., 15 mi. N. of Mountain Home, 10,000 ft., Aug. 22, 1936, *Doutt* 4347 (with *Gentiana plebeia*).

APOCYNACEAE

Amsonia latifolia M. E. Jones

The single specimen cited, collected in a sandy draw of the upper Mixed Desert Shrub Zone, is in flower and shows matured capsules of the preceding season.

Hills E. of Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7691.*

Apocynum cannabinum L.

The single specimen cited is in fruit.

Along Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7400.*

Apocynum hypericifolium Ait.

Apocynum cervinum Greene

Apocynum sibiricum Jacq.

The single specimen cited is in flower.

W. side of Green River near Quarry "L," 4700 ft., June 22, 1931, *Graham 6195.*

Apocynum scopulorum Greene

The single specimen cited is in flower. Members of this genus, collectively known as Dogbane or Indian Hemp, are generally con-

sidered poisonous to stock and are looked upon with suspicion, though little is known of their harmful properties.

Between sheep bridge, Uinta River, and Chain Lakes, 9000 ft., July 23, 1933, *Graham 8637*.

ASCLEPIADACEAE

Asclepias cryptoceras S. Wats. MILKWEED

Common throughout the Basin in the Mixed Desert Shrub Zone. The species is sometimes locally called "Cow Cabbage." The April specimen is in bud; the May specimens are in flower; the June numbers exhibit maturing pods.

Although distasteful and not eaten by choice, sheep will sometimes eat enough milkweed to cause poisoning. None of the species occurring in the Uinta Basin, however, is as serious in this respect as certain other western and southwestern species.

Flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6170;* hills E. of Dinosaur Quarry, 5000 ft., April 29, 1933, *Graham 7561;* bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7913;* desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8301;* S. slope of Leland Bench, 5000 ft., May 14, 1935, *Graham 8850;* Draw E. of Willow Creek near schoolhouse, 5300 ft., May 24, 1935, *Graham 8973;* Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9176;* hills E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.*

Asclepias labriformis M. E. Jones See Proc. Calif. Acad. Sci. ser. 2, **5**: 708. 1895. MILKWEED

While the three specimens cited are almost unquestionably referable to this species, the two August numbers, which bear mature pods but no flowers, have leaves up to seven inches along and one inch wide, and are therefore larger than the type, which has leaves described as 3-5 in. long and one-fourth inch wide. The flowering June number is typical. This plant may be poisonous to cattle, as some other milkweeds are, for several dead cows were observed lying among the scattered plants of this species along Willow Creek. The species has been known only from southern Utah and our specimens represent a northward extension of range.

Flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6160;* flat

above Quarry "L," 4800 ft., Aug. 31, 1931, *Graham 7361;* Willow Creek road SE. of White River, 5000 ft., Aug. 5, 1935, *Graham 9982.*

Asclepias speciosa Torr. MILKWEED

Common throughout the Basin at low altitudes, especially along irrigation ditches and in moist, cultivated fields. *Graham 6249* is in bud; *Graham 6176* and *9790* are in flower; the August and September numbers show mature pods. It is considered slightly poisonous to sheep but it is rarely eaten by them.

Flat between Ouray and Quarry "L," 4700 ft., June 21, 1931, *Graham 6176;* Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6249;* W. side of Green River, near Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7356;* along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7422;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9790.*

CONVOLVULACEAE

Convolvulus americanus (Sims) Greene BINDWEED

The single specimen cited is in flower. The species is very closely related to the European *Convolvulus sepium* L.

Marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9787.*

Convolvulus arvensis L.

Convolvulus ambigens House

The following specimen is in the herbarium of the Missouri Botanical Garden: waste ground, Vernal, July 16, 1933, *Hermann 4925* (also in the U. S. Nat. Herb. and Univ. Mich.).

Cuscuta planiflora Ten. DODDER

The following specimen is in the herbarium of F. J. Hermann at Ann Arbor, Michigan: on *Convolvulus arvensis*, waste ground, Vernal, July 16, 1933, *Hermann 4926.*

POLEMONIACEAE

Collomia grandiflora Dougl.

The single specimen cited, from near the southeast Basin rim, is in fruit. The species is here reported from Colorado for the first time, its range being extended slightly eastward.

E.-facing slope of Stuart Creek, Colo., 7500 ft., July 18, 1935, *Graham 9747.*

Collomia linearis Nutt.

Collomia lanceolata Greene

Fairly frequent at mid-altitudes throughout the Basin. *Graham 9724* shows opened capsules; the other specimens cited are in flower.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6453;* SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9325;* Rock Creek, below Willow Springs, 9200 ft., July 11, 1935, *Graham 9595;* upper middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9724.*

Gilia aggregata attenuata Gray SKYROCKET

Collected only on the Tavaputs Plateau in Sub-montane Shrub near the southernmost Basin rim. Both specimens cited are in flower. The plant is not here considered to be synonymous with *Gilia pulchella* Dougl. as it is considered to be by Rydberg (1922 p. 694).

Meadow-pasture NW. of Willow Springs, 9600 ft., July 10, 1935, *Graham 9564;* ridge W. of head of Post Canyon, 8000 ft., July 27, 1935, *Graham 9850.*

Gilia congesta Hook.

Frequent at low altitude in the central Basin. The specimens are all in flower, with the late June and July numbers showing developing capsules also. *Graham 8320* is intermediate between typical *Gilia congesta* and *Gilia crebrifolia* Nutt.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6119;* flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6145;* Vernal-Manila road N. of Vernal, 6500 ft., June 19, 1933, *Graham 8167;* Pass, head of Smith Wells Draw, 7500 ft., June 28, 1933, *Graham 8320;* Red Bluff Wash, between White and Green Rivers, May 27, 1908, *Douglass s. n.;* Devil's Play Ground, between White and Green Rivers, June 23, 1908, *Douglass s. n.;* bluffs between White and Green Rivers, July 1, 1908, *Douglass s. n.;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.*

Gilia inconspicua (Smith) Dougl.

Fairly frequent at low altitudes throughout the Basin. *Graham 8051, 8885,* and *9090* are in early anthesis; the other numbers show a few late flowers with matured capsules. *Graham 8051* and *Peterson s. n.* (May 30) represent extreme depauperate phases of the species, with the leaves chiefly cauline instead of basal-rosulate. They may represent a geographic variety at the eastern end of the species range.

Junction of Juniper and Aspen Zones, Uinta River Canyon, 7000 ft., June 2, 1933, *Graham 8051;* bench W. of Green River, just S. of Uteland Butte, 4800 ft., May 16, 1935, *Graham 8885;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9090;* Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9149;* NE. of Dinosaur Quarry, May 30, 1912, *Peterson s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Gilia inconspicua (Smith) Dougl. ex. Hook. var. **subacaulis** (Rydb.) Brand

Gilia subacaulis Rydb.

The single, rather dwarfed specimen cited, from a Greasewood flat, is in flower.

Between Dinosaur Quarry and Green River, 4800 ft., May 19, 1933, *Graham 7738.*

Gilia McVickerae M. E. Jones See Proc. Calif. Acad. Sci. ser. 2, **5**: 712. 1895.

The single specimen cited shows flowers and a few mature capsules. It was very probably collected somewhere in eastern Uintah County at low or possibly mid-altitude. The species is endemic to Utah, having been originally described from Marysvale in the southwestern part of the state.

Uinta Basin, July 13, 1912, *Peterson s. n.*

Gilia pinnatifida Nutt. ex. Gray

The single specimen cited, from the Mixed Desert Shrub Zone, is in flower and is here reported from Utah for the first time, its range thus being extended westward.

Bluffs between White and Green Rivers, July 1, 1908, *Douglass s. n.*

Gilia polycladon Torr.

Fairly frequent at low altitudes throughout the Basin. The specimens all show flowers, with maturing capsules on *Graham 9017* and *Peterson s. n.*

E. of Willow Creek, near schoolhouse, 5300 ft., May 24, 1935, *Graham 8977;* Greasewood flat above marsh, mouth of Ashley Creek, 4800 ft., May 30, 1935, *Graham 9017;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Gilia pulchella Dougl. SKYROCKET

Gilia aggregata (Pursh) Spreng.

Common at low and especially at mid-altitudes throughout the Basin. It is particularly frequent in Sagebrush areas, and is locally called "Honeysuckle." The specimens all show flowers, with developing capsules on some of the later numbers. A specimen (*Graham 8090*) was also collected in Jackson Draw, on the north slope of the Uinta Mts.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6277;* Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6326*, *Graham 6352;* Dry Fork, in Juniper Zone, 7000 ft., Sept. 5, 1931, *Graham 7453;* Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8020;* Vernal-Manila road N. of Vernal, 6500 ft., June 19, 1933, *Graham 8155;* near Little Lake, 8300 ft., June 23, 1933, *Graham 8246;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9088;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9464;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 10017;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.;* Red Creek, 2 mi. N. of Fruitland, 6700 ft., Aug. 14, 1936, *Doutt 4321.*

Gilia pumila Nutt.

Frequent on lowland flats in the central Basin. The specimens all show flowers and mature capsules.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6103*, *Graham 6115;* flat between Ouray and Quarry "L," 4700 ft., June 21, 1931, *Graham 6179;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Gilia stenothyrsa Gray

The single specimen cited, probably collected at low altitude in east central Uintah County, is in flower with maturing capsules. This species is a Uinta Basin endemic. It was originally collected by Fremont in a "cedar forest" in the Uinta Mts., very probably near the present town of Whiterocks (see Gray, Proc. Amer. Acad. **8**: 276. 1870).

Uinta Basin, June 9, 1912, *Peterson s. n.*

Leptodactylon pungens (Torr.) Nutt.

Gilia pungens (Torr.) Benth.

Common at low altitudes throughout the Basin, especially on rocky,

exposed situations. *Graham 6122, 7325, 7456* and *Peterson s. n.* (June 9) are vegetative specimens; the others show flowers.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6122;* between Green River and Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7325;* Dry Fork, in Juniper Zone, 7000 ft., Sept. 5, 1931, *Graham 7456;* bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7919;* E. of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8923;* Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9166;* S. of Red Bluff Wash, May 24, 1908, *Douglass s. n.;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Leptodactylon Watsonii (Gray) Rydb.

Gilia Watsonii Gray

The single specimen cited is in flower.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6269.*

Linanthus Harknessii (Curran) Greene

Gilia Harknessii Curran

Collected in the extreme west and east ends of the Basin at mid-altitude. Both specimens show flowers and developing capsules.

Head of Deep Channel Creek, Colo., 6400 ft., June 4, 1935, *Graham 9109;* Horse Creek, 7700 ft., June 18, 1935, *Graham 9246.*

Microsteris micrantha (Kell.) Greene

Collomia micrantha Kell.
Gilia micrantha (Kell.) A. Nels.

Collected only at mid-altitude in large river canyons on the south slope of the Uinta Mts. *Graham 7808* shows flowers, the other number exhibits both flowers and maturing capsules.

Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7808;* Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7970.*

Phlox caespitosa Nutt.

Occasional at mid- and upper altitudes in the Uinta Mts. The specimens cited are in flower.

Slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6638, Graham 6656;* Yellowstone (East Fork of Lake Fork) Creek, 12 mi. N. of Mountain Home, 7800 ft., Aug. 18, 1936, *Doutt 4342.*

Phlox canescens T. and G.

Infrequent at low altitude in the central Basin. The specimens cited are all in flower, and *Graham 7519* represents a dwarf form of the species.

5 mi. NW. of Dinosaur Quarry, 5500 ft., April 24, 1933, *Graham 7519;* NE. of Dinosaur Quarry, May 30, 1912, *Peterson s. n.;* N. bluff, White River, April 19, 1932, *Sweadner s. n.*

Phlox densa Brand

The single flowering specimen cited is tentatively referred to this species.

Burned-over slope of Calamity Ridge, S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6500 ft., June 1, 1935, *Graham 9057.*

Phlox Hoodii Richards. MOSS PINK, MOSS PHLOX

Infrequent at low altitude in the central Basin. The specimens cited all show flowers. The species is here reported from Utah for the first time, its range thus being extended southward.

9 mi. SSE. of Vernal, 5000 ft., April 27, 1933, *Graham 7533;* bad lands N. of Skull Pass Quarry, 5000 ft., May 9, 1933, *Graham 7633;* near spring, S. slope of Diamond Mt., 6000 ft., June 5, 1933, *Graham 8083;* desert 9 mi. SSE. of Vernal, 5000 ft., May 2, 1935, *Graham 8746.*

Phlox longifolia Nutt. SWEET WILLIAM

Abundant at low altitudes throughout the Basin. It is one of the earliest flowers of spring in the Mixed Desert Shrub Zone. *Doutt 884* is an over-mature specimen; all the other numbers are in flower with *Graham 6375* and *8165* showing developing capsules also. A glabrous form (*Graham 8314*) was also collected north of Wellington on the south side of the Book Cliffs.

Davis Hollow, Taylor Mt., 8500 ft. (?), June 24, 1931, *Graham 6316, Graham 6375;* 5 mi. NW. of Dinosaur Quarry, 5500 ft., May 16, 1933, *Graham 7672;* Asphalt Ridge, S. of Lapoint road, 6000 ft., May 25, 1933, *Graham 7836;* between Pariette Mine and upper Sand Wash, 5000 ft., May 26, 1933, *Graham 7843;* Vernal-Manila road N. of Vernal, 6500 ft., June 19, 1933, *Graham 8165;* E. of Willow Creek, near Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8940;* W. of Willow Creek, Thorne's ranch, 5400 ft., May 23, 1935, *Graham 8961;* Horse Creek, 7700 ft., June 18, 1935, *Graham 9247;* Post Canyon, 8000 ft.,

July 29, 1935, *Graham 9920* (two forms, a glabrous one, "A," and a puberulent one, "B" are on this sheet); E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.;* Willow Creek, 2 mi. above Thorne's ranch, 5300 ft., June 29, 1933, *Doutt 884.*

The following flowering numbers represent a glabrous form of the species: S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9077;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9496.*

The following flowering numbers represent a reduced form of the species: E. of Dinosaur Quarry, 5000 ft., April 29, 1933, *Graham 7567;* Skull Pass Quarry, 5000 ft., May 6, 1933, *Graham 7611;* bad lands N. of Skull Pass Quarry, 5000 ft., May 9, 1933, *Graham 7627;* along Brush Creek, W. of Dinosaur Quarry, 5000 ft., May 16, 1933, *Graham 7680;* hills E. of Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7698;* talus slope, W. side of Green River, S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7885;* N. side of White River, 4 mi. NE. of mouth of Evacuation Creek, 5300 ft., May 7, 1935, *Graham 8771, Graham 8775;* 5 mi. W. of Bitter Creek, along Watson-Ouray road, 6300 ft., May 26, 1935, *Graham 8985.*

Phlox multiflora A. Nels.

Infrequent at low or mid-altitudes on the south slope of the Uinta Mts. The specimens cited are all in flower.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6317;* Vernal-Manila road N. of Vernal, 5500 ft., June 19, 1933, *Graham 8153;* near Little Lake, 8500 ft., June 22, 1933, *Graham 8225.*

Phlox muscoides Nutt.

The single specimen cited is in flower. The species is not listed in the manuals from Utah, and our specimens would extend its range southward.

Cottonwood Springs, Little Mt., 6600 ft., May 22, 1933, *Graham 7776.*

Phlox speciosa Pursh

The single flowering specimen cited seems to be a lax, small-flowered phase of this species which may be shown, through additional material, to deserve taxonomic segregation. The locality cited is considerably south and east of the recognized range of *P. speciosa.*

Talus slope, W. side of Green River, S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7884*.

Polemonium foliosissimum Gray

The single flowering specimen cited was collected in the extreme west end of the Basin in Sagebrush of the upper Sub-montane Shrub Zone.

Head of Horse Creek, 7800 ft., June 17, 1935, *Graham 9220*.

Polemonium occidentale Greene

The single flowering specimen cited was collected in the west end of the Basin in a moist meadow patch along the creek at mid-altitude.

W. side of Red Creek, 7500 ft., June 27, 1935, *Graham 9444*.

Polemonium pulcherrimum Hook.

The specimens cited, except the flowering *Graham 8360*, are atypical. *Graham 9698* is a tall, lax plant collected near the southeast Basin rim; it shows both flowers and mature capsules. The other specimens were collected in the Uinta Mts. *Graham 8395* is a white-flowered plant; *Graham 10023* shows fruit only.

E. side of Paradise Park reservoir, 10,000 ft., July 4, 1933, *Graham 8360;* Blanchard Park, head of Dry Fork Creek, 10,000 ft., July 5, 1933, *Graham 8395;* head of West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9698;* woods NE. of Paradise Park, 10,200 ft., Aug. 16, 1935, *Graham 10023*.

Polemonium viscosum Nutt. SKUNK WEED

Fairly frequent in rocky places or small meadow patches of the Alpine Zone in the Uinta Mts. The specimens cited all bear flowers.

Slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6637;* ridge NNW. of Paradise Park, 11,-11,500 ft., July 8, 1933, *Graham 8432;* N. of Chain Lakes, 11,400 ft., July 20, 1933, *Graham 8574*.

HYDROPHYLLACEAE

Capnorea pumila (Dougl.) Greene

Villarsia pumila Dougl.

Whiterocks, 6000 ft., May 10, 1914, *DeMoisy Jr. 12*, USFS 18919.

Hydrophyllum capitatum Dougl. WATER LEAF

Collected only in the west end of the Basin in Aspen woods. Both specimens are in flower.

E. slope of Wolf Creek Pass, 9000 ft., June 16, 1933, *Graham 8140;* Horse Creek, 7700 ft., June 18, 1935, *Graham 9259.*

Nama densum Lemmon var. **parviflorum** (Greenman) C. L. Hitchc. See. Am. Journ. Bot. **20**: 420. 1933.

Conanthus parviflorus Greenman, in large part

Frequent in sandy areas of low altitude. Both specimens are in flower.

Bench W. of Green River, just S. of Uteland Butte, 4800 ft., May 16, 1935, *Graham 8886;* Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9140.*

Nemophila breviflora A. Gray BABY BLUE EYES

The single fruiting specimen cited was collected in the extreme west end of the Basin, where it formed a nearly exclusive herbaceous ground cover under Aspens.

Horse Creek, 7700 ft., June 18, 1935, *Graham 9265.*

Phacelia crenulata Torr. var. **corrugata** (A. Nels.) Brand

Phacelia corrugata A. Nels. SCORPION WEED

Common throughout the Basin at low altitudes. For the most part the May specimens are in flower, the June numbers in fruit.

Flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6171a;* flat between Ouray and Quarry "L," 4700 ft., June 21, 1931, *Graham 6182;* talus slope, S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7890;* bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7910;* S. edge of Leland Bench just N. of Pariette Creek, 5000 ft., May 14, 1935, *Graham 8843;* SE.-facing rocky slope, W. side of Duchesne River, 4 mi. above Ouray, 4800 ft., May 15, 1935, *Graham 8865;* south of Red Bluff Wash, May 24, 1908, *Douglass s. n.;* hills and ravines E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* Ainge Gulch, 5 mi. N. of Jensen, May 29, 1912, *Peterson s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.;* Uinta Basin, June 26, 1912, *Peterson s. n.*

Phacelia demissa Gray

Frequent throughout low altitudes, often in hard-packed clay soils. The May specimens are in flower; the June numbers show developing capsules. The specimens cited represent an entity here called *Phacelia demissa*, although in their much larger flowers and certain other characters they are not typical of that species.

Bad lands, Skull Pass Quarry, 5000 ft., May 6, 1933, *Graham 7606;* Douglass Canyon, W. of Dinosaur Quarry, 5000 ft., May 19, 1933, *Graham 7735;* Skull Pass Quarry, 5000 ft., May 18, 1933, *Graham 7830;* bench 5 mi. E. of Vernal, Diamond Mt. road, 5500 ft., June 8, 1935, *Graham 9137;* desert 5 mi. E. of Lapoint, 5700 ft., June 22, 1935, *Graham 9311;* hills and ravines E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.*

Phacelia glandulosa Nutt. var. **deserta** (Nels.) Brand

Phacelia deserta Nels.

The single specimen cited was collected on the southeast Basin rim. The species has been reported only from Wyoming and our specimen is apparently the first Colorado record of the species. It shows flowers and developing capsules.

Middle fork of Stuart Creek, Colo., 7000 ft., July 19, 1935, *Graham 9774.*

Phacelia heterophylla Pursh

The flowering specimens cited were collected in the west end of the Basin in a valley filled with Sub-montane Shrub and Aspens.

Along road, Red Creek valley, 7500 ft., June 26, 1935, *Graham 9429, Graham 9434.*

Phacelia heterophylla Pursh forma **frigida** (Greene) Macbr.

Phacelia heterophylla var. *frigida* (Greene) Jepson

Phacelia frigida Greene

Collected only near the Basin's southeast rim. The species has apparently not been reported before from Colorado, in which case our specimen represents an eastward extension of range. The specimen cited shows flowers and developing capsules.

Middle fork of Stuart Creek, Colo., 7000 ft., July 19, 1935, *Graham 9769.*

Phacelia Ivesiana Torr.

Infrequent at low altitudes. The specimens show flowers and developing capsules.

N. of Dinosaur Quarry, 5500 ft., May 18, 1933, *Graham 7716;* flat between Dinosaur Quarry and Green River, 4800 ft., May 19, 1933, *Graham 7740;* Vernal-Lapoint road W. of Asphalt Ridge, 5800 ft., May 11, 1935, *Graham 8803.*

Phacelia leucophylla Torr.

The single flowering specimen cited was collected under Aspens near the northwest rim of the Basin.

West Fork of Duchesne River, 8000 ft., Sept. 8, 1935, *Graham 10255*.

Phacelia leucophylla forma **alpina** (Rydb.) Macbr.

Phacelia alpina Rydb.

The single flowering specimen cited was collected in Sub-montane Shrub in the west end of the Basin.

E. tributary of Red Creek, 7500 ft., June 26, 1935, *Graham 9392*.

Phacelia sericea (Graham) Gray

Frequent throughout the Basin at mid-altitudes, especially in upper Sub-montane Shrub and Aspen Zones. The specimens show varying stages of anthesis.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6461;* Big Park, Uinta River Canyon, 7500 ft., June 2, 1933, *Graham 8070;* near Little Lake, 8300 ft., June 23, 1933, *Graham 8254;* flood-plain of West Fork just below Moon Lake, 8000 ft., June 25, 1935, *Graham 9373;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9475;* meadow-pasture NW. of Willow Springs, 9600 ft., July 10, 1935, *Graham 9555*.

Phacelia sericea (Graham) Gray var. **ciliosa** Rydb. See Bull. Torrey Bot. Club **31**: 636. 1904.

Phacelia ciliosa Rydb.

Frequent throughout the Basin at mid-altitudes. The June specimens are in flower; the July numbers show maturing capsules. *Graham 6349* and *8151* are referred to the variety, although not typical.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6349;* along Vernal-Manila road N. of Vernal, 6500 ft., June 19, 1933, *Graham 8151;* ridge W. of head of Post Canyon, 8000 ft., July 27, 1935, *Graham 9828;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9869a*.

BORAGINACEAE

Cryptantha ambigua (Gray) Greene See Contr. Gray Herb. n. s. No. **74**. 1925.

Eritrichium muriculatum var. *ambiguum* Gray
Krynitzkia ambigua Gray

Collected only in the west end of the Basin. Both specimens show flowers, with *Graham 9427* showing developing fruit also.

Along road, Red Creek valley, 7500 ft., June 26, 1935, *Graham 9419*, *Graham 9427*.

Cryptantha breviflora (Osterhout) Payson See Ann. Mo. Bot. Gard. **14**: 318. 1927.

Oreocarya breviflora Osterhout

Occasional in the Mixed Desert Shrub Zone of the central Basin at low altitude. The species is a Uinta Basin endemic and our specimens from near the Dinosaur Quarry represent about the type locality, which is Osterhout's (*No. 6414*) "6½ miles north of Jensen," visited in 1925. The specimens all show flowers.

Hills E. of Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7702;* Leota road near Highway US 40, 15 mi. SW. of Vernal, 5000 ft., May 21, 1935, *Graham 8914;* Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9154;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.*

Cryptantha Fendleri (Gray) Greene

Krynitzkia Fendleri Gray

The single specimen cited shows old flowers and developing fruits. Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6324*.

Cryptantha flava (A. Nels.) Payson

Oreocarya flava A. Nels.

Common throughout the Basin in a variety of soils of the Mixed Desert Shrub Zone. All of the specimens are in flower, and the late June numbers show developing nutlets as well.

Flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6151;* Taylor Mt., 15 mi. N. of Vernal, 8500 ft. (?), June 24, 1931, *Graham 6323;* hills E. of Dinosaur Quarry, 5000 ft., April 29, 1933, *Graham 7572;* bad lands N. of Skull Pass Quarry, 5000 ft., May 9, 1933, *Graham 7638;* hills E. of Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7707;* desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8305;* S. slope of Leland Bench, 5000 ft., May 13, 1935, *Graham 8819;* S. slope of Leland Bench, 5000 ft., May 14, 1935, *Graham 8845;* Leota road, near Highway US 40, 15 mi. SW. of Vernal, 5000 ft., May 21, 1935, *Graham 8918;* E. of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8936;* Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9172;* Devil's Play Ground, between White

and Green Rivers, June 23, 1908, *Douglass s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Cryptantha flavoculata (A. Nels.) Payson

Oreocarya flavoculata A. Nels.

Common throughout the Basin at low altitudes, often occurring on weathered shale outcrops. All of the specimens are in flower with the late May and June numbers bearing developing nutlets.

Douglass Canyon, W. of Dinosaur Quarry, 5000 ft., April 28, 1933, *Graham 7546;* hills E. of Dinosaur Quarry, 5000 ft., April 29, 1933, *Graham 7571;* sand hills out Maeser road, 6000 ft., May 2, 1933, *Graham 7582;* 3 mi. W. of Dinosaur Quarry, 5500 ft., May 15, 1933, *Graham 7662;* Cottonwood Springs, Little Mt., 6600 ft., May 22, 1933, *Graham 7771;* bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7926;* Vernal-Manila road N. of Vernal, 6500 ft., June 19, 1933, *Graham 8152, Graham 8173;* 5 mi. W. of Bitter Creek along Watson-Ouray road, 6300 ft., May 26, 1935, *Graham 8987, Graham 8993;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6000 ft., May 31, 1935, *Graham 9032;* burned-over slope of Calamity Ridge, S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6500 ft., June 1, 1935, *Graham 9058.*

Cryptantha gracilis Osterhout

The single specimen cited shows flowers and developing fruits; it sets the northeastern limit of the species.

Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9148.*

Cryptantha Grahamii Johnston

This species, based upon our material from the Uinta Basin, has recently been described in the Journal of the Arnold Arboretum **18**: 23. 1937. All of the specimens of this unique strigose-leaved, large-white-flowered species cited are in flower, with immature nutlets.

Bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7924,* TYPE, Gray Herbarium; cotypes in the Carnegie Museum Herbarium, *Graham 7927;* E. of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8937;* W. of Willow Creek, Thorne's ranch, 5400 ft., May 23, 1935, *Graham 8962.*

Cryptantha Kelseyana Greene

Infrequent in the Mixed Desert Shrub Zone. The May specimens

show flowers and developing fruits; the June number bears mature nutlets.

Flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6163;* Greasewood flat above marsh, mouth of Ashley Creek, 4750 ft., May 30, 1935, *Graham 9022;* NE. of Dinosaur Quarry, May 30, 1912, *Peterson s. n.*

Cryptantha nana (Eastwood) Payson var. **typica** Payson

Oreocarya nana Eastwood

Occasional in the Mixed Desert Shrub Zone. Both specimens are in flower.

Bad lands N. of Skull Pass Quarry, 5000 ft., May 9, 1933, *Graham 7639;* E. of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8943.*

Cryptantha paradoxa (A. Nels.) Payson

Oreocarya paradoxa A. Nels.

Collected only on Leland Bench in the Mixed Desert Shrub Zone. Both specimens are in flower, with developing fruits, and represent a form with leaves pustulate and strigose on the upper surface.

S. slope of Leland Bench, 5000 ft., May 13, 1935, *Graham 8829;* Leland Bench, 5000 ft., May 14, 1935, *Graham 8861a.*

Cryptantha scoparia A. Nels.

Collected only at the locality cited, along the Green River in the central Basin. Both specimens show flowers and developing fruit.

Talus slope, S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7872, Graham 7894.*

Cryptantha sericea (Gray) Payson

Krynitzkia sericea Gray

Collected only at mid-altitude on the Tavaputs Plateau near the Basin's southeast rim. Both specimens cited, which are in flower with maturing nutlets, probably represent Payson's variety *typica*, and are therefore synonymous with Rydberg's *Oreocarya argentea*, Osterhout's *Oreocarya procera*, and Greene's *Oreocarya sericea.*

W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9676;* middle fork of Stuart Creek, Colo., 7500 ft., July 18, 1935, *Graham 9761.*

Cryptantha stricta (Osterhout) Payson

Oreocarya stricta Osterhout

Although collected from only one locality on the south slope of the Uinta Mts., this species is confined to the Uinta Basin region. The type locality is in northwestern Colorado, "south of the Yampa River along the Victory Highway" where it was collected by Osterhout in 1922 (See Ann. Mo. Bot. Gard. **14**: 265. 1927). The specimen shows old flowers and mature nutlets.

Dr. Ivan M. Johnston writes me that Dr. Aven Nelson described Dr. Louis Williams' 1932 collection of this species from the north slope of the Uinta Mountains, in Flaming Gorge, as *Oreocarya Williamsii* (See Am. Journ. Bot. **21**: 578. 1934).

Vernal-Manila road N. of Vernal, 6500 ft., June 19, 1933, *Graham 8163*.

Cryptantha sp.

Concerning the entity represented by these specimens, Dr. Ivan M. Johnston writes: "Apparently not referable to any described species. I can suggest no species I believe closely related to it. The specimens are in flower and do not have even half-matured fruits, so I think it best to refrain from giving it a name. After all the peculiarities of the plants may be matters of immaturity—though I doubt it."

Talus slope, S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7870;* E. of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8938;* Cottonwood Creek, 6000 ft., July 6, 1935, *Graham 9508*.

Eritrichium elongatum (Rydb.) Wight

Eritrichium aretioides elongatum Rydb.

Collected only in the Alpine Zone of the Uinta Mts. Both specimens show flowers and maturing nutlets.

Near top of Marsh Peak, 11,800 ft., July 10, 1933, *Graham 8449;* between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 19, 1933, *Graham 8486*.

Hackelia floribunda (Lehm.) Johnston See Contr. Gray Herb. n.s. **68**: 46. 1923.

Echinospermum floribundum Lehm.

Lappula floribunda Greene

Collected only at mid-altitudes on the Tavaputs Plateau near the

south Basin rim. *Graham 9671* shows flowers in early anthesis; *Graham 9878* bears mature fruit.

W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9671;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9878.*

Hackelia Jessicae (Mac Greg.) Brand

Lappula diffusa of western authors

Lappula Jessicae Mac Greg.

Collected only at the west end of the Basin. *Graham 8137* is in early flower and doubtfully determined; *Graham 9218* is in nearly prime flowering condition. The species was described by MacGregor (Bull. Torr. Bot. Club **37**: 262. 1910) from the Lake Tahoe region, California, but as here treated is widely distributed throughout the northern Rocky Mountain region west to the Sierra Nevada and Cascade Mountains.

E. slope of Wolf Creek Pass, 9000 ft., June 16, 1933, *Graham 8137;* head of Horse Creek, 7800 ft., June 17, 1935, *Graham 9218.*

Hackelia patens (Nutt.) Johnston

Lappula coerulescens Rydb.

Rochelia patens Nutt.

The single flowering specimen cited was collected at the west end of the Basin.

E. tributary of Red Creek, 7500 ft., June 26, 1935, *Graham 9405.*

Heliotropium curassavicum L. var. **obovatum** DC. HELIOTROPE

Heliotropium spathulatum Rydb.

Collected only at the locality cited on Green River lowland. The June specimen is in flower; the August number bears mature fruit.

W. side of Green River near Quarry "L," 4700 ft., June 18, 1931, *Graham 6072;* between Green River and Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7336.*

Lappula echinata Gilib.

The single specimen of this Eurasian introduction cited, from the southeastern Basin rim, shows both flowers and fruit.

W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9665.*

Lappula Redowskii (Hornem.) Greene

Frequent throughout the Basin at low and mid-altitudes. It was also collected (*Graham 8339*) in Pine Canyon on the south slopes of

the Book Cliffs. All the specimens show a few flowers with mature fruit, except *Graham 9430* which is in bud, and so is questionably determined.

Dry Fork, in Juniper Zone, 7000 ft., June 26, 1931, *Graham 6388;* talus slope S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7879;* along road, Red Creek valley, 7500 ft., June 26, 1935, *Graham 9430;* Post Canyon 7800 ft., July 28, 1935, *Graham 9891.*

Lappula Redowskii var. **desertorum** (Greene) Johnston

Common in the Mixed Desert Shrub and lower Juniper-Pinyon Zones throughout the Basin. *Graham 8834* shows only flowers; the other numbers exhibit flowers and fruit, except the June specimens, which bear fruit only.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6287;* between Dinosaur Quarry and Green River, 4800 ft., May 19, 1933, *Graham 7737;* Skull Pass Quarry, 5000 ft., May 18, 1933, *Graham 7829;* bench W. of Green River, S. of mouth of Sand Wash, 5000 ft., May 29, 1933, *Graham 7942;* Leland Bench, 5000 ft., May 13, 1935, *Graham 8834;* bench W. of Green River, S. of Uteland Butte, 4800 ft., May 16, 1935, *Graham 8884;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Lappula texana (Scheele) Britt.

Infrequent at low altitudes. The specimens cited are all in fruit, with *Graham 9024* showing flowers as well.

Greasewood flat above marsh, mouth of Ashley Creek, 4750 ft., May 30, 1935, *Graham 9024;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Lithospermum incisum Lehm.

Lithospermum angustifolium Michx.
Lithospermum linearifolium Goldie

Common throughout the Basin in the Mixed Desert Shrub and Juniper-Pinyon Zones. All of the specimens are in flower.

Douglass Canyon W. of Dinosaur Quarry, 5000 ft., April 28, 1933, *Graham 7544;* hills E. of Dinosaur Quarry, 5000 ft., April 29, 1933, *Graham 7560;* sand hills out Maeser road, 6000 ft., May 2, 1933, *Graham 7585;* Douglass Canyon, W. of Dinosaur Quarry, 5000 ft., May 19, 1933, *Graham 7725;* Cottonwood Springs, Little Mt., 6600 ft., May 22, 1933, *Graham 7781;* Watson-Ouray road between Willow

Creek and Watson, 6000 ft., May 25, 1935, *Graham 8979;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9086;* Ainge Gulch, 5 mi. N. of Jensen, May 29, 1912, *Peterson s. n.*

Lithospermum lanceolatum Rydb.

Lithospermum ruderale lanceolatum (Rydb.) A. Nels.

Collected only on the Tavaputs Plateau east of the Green River. Both specimens cited show matured fruit.

Middle fork of Stuart Creek, Colo., 7500 ft., July 18, 1935, *Graham 9750;* head of Hill Creek, 8500 ft., July 31, 1935, *Graham 9944.*

Mertensia arizonica Greene var. **Grahami** L. Williams See Ann. Mo. Bot. Gard. **24**: 65. 1937.

In this variety, which is based upon our material, the corolla is smaller than in the species, with tube 4-6 mm. long, glabrous at the base, limb 5-7 mm. long; insertion of filaments lower in the tube, about 1.5 mm. long; anthers about 3 mm. long, base reaching down to the fornices; calyx 3-4 mm. long in anthesis, the triangular acute lobes half as long, becoming much enlarged in fruit, up to 10 mm. long, the lobes longer than the tube; nutlets 4-5 mm. long, slightly rugose.

The variety *Grahami* is closely related to the species and to the variety *Leonardi*, but by reason of the smaller flowers, attachment and position of the stamens, and structure of the calyx is distinct. It is also disjunct in range.

Canyon at head of West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9667*, TYPE, in Missouri Botanical Garden Herbarium with cotypes in the Carnegie Museum Herbarium and the Herbarium of Louis Williams. The variety is also represented by a specimen in the U. S. National Herbarium from the Roan Mountains, Colorado, collected by Cockerell, July 8, 1922.

Mertensia arizonica var. **Leonardi** (Rydb.) Johnston

This species was collected only at the extreme west end of the Basin in the Aspen Zone. Both specimens are in flower, with *Graham 9228* showing immature fruit as well.

E. slope of Wolf Creek Pass, 9000 ft., June 16, 1933, *Graham 8141;* head of Horse Creek, 7800 ft., June 17, 1935, *Graham 9228.*

Mertensia Bakeri Greene

The specimens cited, collected in the Alpine Zone of the Uinta Mts., are in flower, with young fruit on *Graham 8565*.

Ridge NNW. of Paradise Park, 11,300 ft., July 8, 1933, *Graham 8424;* above trees in meadow N. of Chain Lakes, 11,400 ft., July 20, 1933, *Graham 8565*.

Mertensia brevistyla S. Wats.

The single specimen cited, collected in the extreme west end of the Basin, shows flowers and maturing fruit.

Horse Creek, 7700 ft., June 18, 1935, *Graham 9248*.

Mertensia ciliata (James) G. Don

Common in mid- and upper altitude woodlands of the Uinta Mts., and occasionally in Alpine Zone meadows. All of the specimens cited are in flower.

W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6512;* up creek N. of Moon Lake, 8200 ft., July 1, 1931 *Graham 6552;* slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6660;* Blanchard Park, head of Dry Fork Creek, 10,000 ft., July 5, 1933, *Graham 8393;* meadow above trees, N. of Chain Lakes, 11,400 ft., July 20, 1933, *Graham 8569;* Lodgepole-Spruce woods between Paradise Park and Chepeta Lake, 10,000 ft., Aug. 20, 1935, *Graham 10086*.

Mertensia fusiformis Greene

Common in mid-altitude woodlands and meadows throughout the Basin. All of the specimens cited show flowers, except *Graham 6541a*, which is a poor specimen showing maturing fruit, and *Graham 6303*, *8067* and *9114*, which exhibit developing nutlets also. The species was also collected (*Graham 8099*) in Jackson Draw on the north slope of the Uinta Mts.

Davis Hollow, Taylor Mt., 15 mi. N. of Vernal, 8500 ft., June 24, 1931, *Graham 6303;* up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6541a;* Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7806;* Uinta River Canyon, 7500 ft., June 2, 1933, *Graham 8067;* Pot Creek road, NE. of Little Brush Creek Knob, 7500 ft., June 7, 1933, *Graham 8120;* Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8198;* head of Deep Channel Creek, Colo., 6400 ft., June 4, 1935, *Graham 9114*.

Mertensia viridis A. Nels. var. **dilatata** (Nels.) L. Williams

The single flowering specimen cited was collected in the east end of the Basin. It seems to be a mixture of *Mertensia viridis*, which has the upper surface of the leaves minutely strigose, and *Mertensia viridis* var. *dilatata*, which has the upper surface of the leaves glabrous.

Burned-over slope, S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6500 ft., June 1, 1935, *Graham 9070*.

VERBENACEAE

Lippia cuneifolia (Torr.) Steud.

Phyla cuneifolia (Torr.) Greene

The single flowering specimen cited was collected along the Green River in the central Basin.

Along river bank, Ouray, July 1, 1933, *Doutt 895*.

Verbena bracteata Lag. and Rodr. VERVAIN

Collected only at the locality cited on the Green River flood-plain. The early specimen is in flower with developing fruit; the later one is in mature fruit.

W. side of Green River near Quarry "L," 4700 ft., June 18, 1931, *Graham 6078;* W. side of Green River near Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7341*.

LABIATAE

Agastache urticifolia (Benth.) Rydb. GIANT HYSSOP

Lophanthus urticifolius Benth.

The single flowering specimen cited was collected near the Basin's southeast rim.

W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9700*.

Dracocephalum parviflorum Nutt. DRAGON'S HEAD

Moldavica parviflora (Nutt.) Britton

Frequent at mid-altitudes throughout the Basin. The June and mid-July specimens are in flower; the later numbers exhibit maturing fruit.

Along road, Red Creek Valley, 7500 ft., June 26, 1935, *Graham 9431;* W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9650;*

Post Canyon, 7800 ft., July 28, 1935, *Graham 9869;* Bitter Creek, 3 mi. E. of Utah-Colorado state line, 7800 ft., Aug. 30, 1935, *Graham 10172.*

Leonurus Cardiaca L. MOTHERWORT

The single specimen cited was collected in a moist area at low altitude; it shows flowers and maturing nutlets.

Uinta River W. of Lapoint, 5700 ft., July 23, 1933, *Graham 8612.*

Lycopus americanus Muhl.

The following specimen is in the herbarium of F. J. Hermann at Ann Arbor, Michigan: edge of stream W. of Lapoint, July 23, 1933, *Hermann 5279* (also in Mo. Bot. Gard.).

Lycopus asper Greene WATER HOREHOUND, BUGLE WEED

The single specimen cited, collected in a moist area along the Green River in the central Basin, shows flowers and developing nutlets.

Marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9815.*

Mentha Penardi (Briq.) Rydb. PEPPER, WOOD, or WILD MINT

Common in moist places of low altitude throughout the Basin. The June and July specimens show flowers; all of the others show both flowers and developing nutlets.

W. side of Green River, near Quarry "L," 4700 ft., June 21, 1931, *Graham 6203;* W. side of Green River, near Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7349b* (with *Stachys scopulorum, Graham 7349a);* Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7387;* along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7416, Graham 7436;* Dry Fork, in Juniper Zone, 7000 ft., Sept. 5, 1931, *Graham 7440;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 10018;* White River bottom near Utah-Colorado state line, July 6, 1908, *Douglass s. n.*

Monarda menthaefolia Benth. HORSE or LEMON MINT, WILD BERGAMOT

The single flowering specimen cited was collected at the east end of the Basin.

Along Piceance Creek 5-10 mi. below Rio Blanco, Colo., 7000 ft., July 17, 1935, *Graham 9710.*

Monardella odoratissima Benth. subsp. **glauca** (Greene) Epling See
Ann. Mo Bot. Gard. **12**: 62. 1925. WESTERN PENNYROYAL,
Madronella oblongifolia Rydb. MUSTANG or FALSE HORSE-MINT
Madronella purpurea A. Nels.

The single flowering specimen cited was collected on the southwestern Basin rim. According to Epling's map (loc. cit.) it is the only subspecies (of seven) which occurs in Utah and it ranges into northern Arizona, central and northern Nevada, northern California, southwestern and northeastern Oregon, and southern Idaho. This specimen is therefore on the eastern limit of its range.

Rocky E. rim of Range Creek near Willow Springs, 9600 ft., July 12, 1935, *Graham 9618*.

Prunella vulgaris L. SELF-HEAL, HEAL-ALL

This naturalized Eurasian plant was collected in moist areas at mid-altitude. The specimens are in anthesis.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6264;* S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6456*.

Stachys scopulorum Greene HEDGE NETTLE

Collected only on the Greene River flood-plain in the central Basin. Both specimens show fruits with flowers also on *Graham 7343*.

W. side of Green River, near Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7343*, *Graham 7349a* (with *Mentha Penardi*, *Graham 7349b*).

SOLANACEAE

Datura Stramonium L. JIMSON WEED, THORN APPLE

The single specimen of this Asiatic introduction cited shows flowers and immature fruit. The Jimson Weed is a very poisonous plant, the poison being concentrated particularly in the seeds. It is rarely eaten by stock and in the Basin has not as yet escaped from gardens where it infrequently appears as an adventive.

Swain's garden, Lapoint, 5500 ft., Aug. 8, 1935, *Graham 9988*.

Nicotiana attenuata Torr. WILD TOBACCO

Nicotiana Torreyana Nels. and Macbr.

The single specimen cited was collected in a canyon of the Tavaputs Plateau; it shows flowers and fruit. The species was also collected (*Graham 9705*) along East Salt Creek on the south slope of the Book Cliffs. It is considered poisonous, especially to cattle and horses,

but is so scarce in the Basin that its danger is negligible. It may give a disagreeable odor to milk from cows which have eaten it.

Burned-over ground, Florence Canyon, 6000 ft., Aug. 1, 1935, *Graham 9957*.

Solanum triflorum Nutt.

The single specimen cited, from the west end of the Basin, is in flower.

Red Creek, 2 mi. N. of Fruitland, 6700 ft., Aug. 14, 1936, *Doutt 4320*.

SCROPHULARIACEAE

Adenostegia Kingii (S. Wats.) Greene

S. slope of Farm Creek Mt., along telephone line, 7000 ft., Sept. 17, 1914, *DeMoisy Jr. 165*, USFS 18798.

Adenostegia ramosa (Nutt.) Greene

Cordylanthus ramosus Nutt.

The single specimen cited, which shows flowers and mature capsules, was collected in Sagebrush in the west end of the Basin.

Red Creek, 4 mi. N. of Fruitland, 6700 ft., Aug. 14, 1936, *Doutt 4314*.

Castilleja chromosa A. Nels. INDIAN PAINT BRUSH

One of the most common species in the vernal aspect of the Mixed Desert Shrub Zone, and one of the earliest flowering species in the Basin. It may also reach mid-altitudes. *Graham 7643*, *7677*, *8869*, and *Doutt 4330* represent yellow flowering phases of the species. All of the specimens show flowers, with developing capsules on some of the late May and June numbers, and dried capsules of the preceding season on a few of the earliest specimens.

Davis Hollow, Taylor Mt., 8500 (?) ft., June 24, 1931, *Graham 6364a;* 5 mi. NW. of Dinosaur Quarry, 5500 ft., April 24, 1933, *Graham 7516;* 9 mi. SSE. of Vernal, 5000 ft., April 27, 1933, *Graham 7537;* Douglass Canyon, W. of Dinosaur Quarry, 5000 ft., April 28, 1933, *Graham 7559b;* hills E. of Dinosaur Quarry, 5000 ft., April 29, 1933, *Graham 7568;* bad lands N. of Skull Pass Quarry, 5000 ft., May 9, 1933, *Graham 7643*, *Graham 7644;* 5 mi. NW. of Dinosaur Quarry, 5500 ft., May 16, 1933, *Graham 7676;* along Brush Creek, W. of Dinosaur Quarry, 5000 ft., May 16, 1933, *Graham 7677;* Cottonwood

Springs, Little Mt., 6600 ft., May 22, 1933, *Graham 7784;* Pariette Mine, 10 mi. SE. of Myton, 5000 ft., May 26, 1933, *Graham 7841;* bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7906, Graham 7928;* Uinta River Canyon, 7000 ft., June 2, 1933, *Graham 8053;* Pot Creek Road, NE. of Little Brush Creek Knob, 8000 ft., June 7, 1933, *Graham 8124;* near Little Lake, 8300 ft., June 23, 1933, *Graham 8250, Graham 8255;* Pass, head of Smith Wells Draw, 8000 ft., June 28, 1933, *Graham 8322;* N. side of White River, 4 mi. NE. of mouth of Evacuation Creek, 5300 ft., May 7, 1935, *Graham 8774;* S. slope of Leland Bench, 5000 ft., May 14, 1935, *Graham 8842;* rocky slope, W. side of Duchesne River, 4 mi. above Ouray, 4800 ft., May 15, 1935, *Graham 8868, Graham 8869;* E. of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8935;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6000 ft., May 31, 1935, *Graham 9045;* Uinta Basin, S. of Red Bluff, May 24, 1908, *Douglass s. n.;* N. of White River, 5 mi. above Dragon-Vernal stage road, June 25, 1908, *Douglass s. n.;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.;* Ainge Gulch, E. of Dinosaur Quarry, June 17, 1912, *Douglass s. n.;* Red Creek, 2 mi. N. of Fruitland, 6700 ft., Aug. 16, 1936, *Doutt 4330.*

Castilleja exilis A. Nels.

Castilleja stricta Rydb., not DC.

Collected only in Desolation Canyon of the Green River near the southern limit of the Basin. Both specimens cited are in flower.

Desolation Canyon, Green River at mouth of Florence Canyon, 4300 ft., Aug. 1, 1935, *Graham 9964;* Desolation Canyon, Green River, above mouth of Florence Canyon, 4400 ft., Aug. 2, 1935, *Graham 9971.*

Castilleja flava S. Wats.

Frequent at mid-altitudes of the Tavaputs Plateau. All of the specimens show flowers, with capsules on *Graham 9458* and *9837.*

N. slope of E. side-canyon, 16 mi. by road up Indian Canyon from Duchesne, 6800 ft., June 28, 1935, *Graham 9458;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9484;* Willow Springs, 9550 ft., July 10, 1935, *Graham 9552;* Post Canyon, 8000 ft., July 27, 1935, *Graham 9837.*

Castilleja Leonardi Rydb.

This Utah endemic is frequent at mid- and upper altitudes throughout the Basin. All of the specimens are in flower, with capsules also on *Graham 6526*. *Douglass s. n.* is an atypical specimen, with bracts entire and pale as in *C. Leonardi*, but anterior lip too large and prominent and lateral calyx-lobes too distinct at the apex.

Up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6526;* slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6655;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9495;* E. rim of Range Creek, near Willow Springs, 9700 ft., July 13, 1935, *Graham 9624;* Diamond Mt., Aug. 5-7, 1912, *Douglass s. n.*

Castilleja linariaefolia Benth.

Common at mid-altitudes throughout the Basin, especially in Sagebrush areas of the Sub-montane Shrub Zone. All of the specimens are in flower with capsules on the late July to September numbers.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6234;* Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6364;* Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7371;* near Little Lake, 8300 ft., June 23, 1933, *Graham 8265;* SE. slope of Mosby Mt., 8000 ft., July 3, 1933, *Graham 8355;* Uinta River, W. of Lapoint, 5700 ft., July 23, 1933, *Graham 8616;* between sheep bridge, Uinta River, and Chain Lakes, 9500 ft., July 23, 1933, *Graham 8639;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9494;* Willow Springs, 9300 ft., July 11, 1935, *Graham 9581;* along Piceance Creek 5-10 mi. below Rio Blanco, Colo., 7000 ft., July 17, 1935, *Graham 9714;* middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9716;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 9996;* Baxter Pass, Colo., 8300 ft., Aug. 29, 1935, *Graham 10162;* Yellowstone (East Fork of Lake Fork) Creek, 12 mi. N. of Mountain Home, 7800 ft., Aug. 18, 1936, *Doutt 4337*.

Castilleja miniata Dougl.

Frequent at mid- and upper altitudes throughout the Basin. All of the specimens are in flower with capsules developing on the late July and August numbers.

Blanchard Park, head of Dry Fork Creek, 10,000 ft., July 5, 1933, *Graham 8386, Graham 8400;* meadow along stream above Chain Lakes, 11,000 ft., July 20, 1933, *Graham 8536;* SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9334;* W. side of Red Creek, 7500 ft., June 27,

1935, *Graham 9441;* Basin rim near Willow Springs, 9600 ft., July 10, 1935, *Graham 9557;* Baxter Pass, Colo., 8300 ft., Aug. 29, 1935, *Graham 10159;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Castilleja pulchella Rydb.

Infrequent at upper altitudes in the Uinta Mts., especially in meadow patches of the Alpine Zone. The species has apparently not been reported before from Utah, its range thus being extended southward. The early July specimen is in flower with dry capsules of the preceding season; the later numbers show both flowers and developing capsules.

Ridge NNW. of Paradise Park, 11,000 ft., July 8, 1933, *Graham 8430;* between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 19, 1933, *Graham 8480;* Chepeta Lake, 10,600 ft., Aug. 21, 1935, *Graham 10104.*

Castilleja rhexifolia Rydb.

Infrequent at mid- and upper altitudes throughout the Basin. All the specimens show flowers and maturing capsules.

Meadow along stream above Chain Lakes, 11,000 ft., July 20, 1933, *Graham 8550;* Post Canyon, 8000 ft., July 27, 1935, *Graham 9829;* Chepeta Lake, 10,600 ft., Aug. 21, 1935, *Graham 10094.*

Castilleja septentrionalis Lindl.

Castilleja sulphurea Rydb.

Occasional throughout a wide range of altitudinal zones of the Uinta Mts. All of the specimens are in flower, except the August number, which shows maturing capsules.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6466;* along Uinta River, E. of Hayden, 5700 ft., June 2, 1933, *Graham 8039;* SE. slope of Mosby Mt., 8000 ft., July 3, 1933, *Graham 8346;* Queant Lake, 10,700 ft., Aug. 22, 1935, *Graham 10136.*

Castilleja viscida Rydb.

This Utah endemic was collected only in meadows of upper altitude zones in the Uinta Mts. Both specimens are in flower with old capsules on *Graham 8547.*

Blanchard Park, head of Dry Fork Creek, 10,000 ft., July 5, 1933, *Graham 8403;* meadow along stream above Chain Lakes, 11,000 ft., July 20, 1933, *Graham 8547.*

Collinsia parviflora Dougl. BLUE-EYED MARY

Collinsia tenella (Pursh) Piper

Frequent at mid-altitudes throughout the Basin. All of the specimens show flowers and developing capsules except *Graham 7987* which possesses flowers only.

Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7807;* Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7987;* burned-over slope of Calamity Ridge, S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6500 ft., June 1, 1935, *Graham 9068;* head of Horse Creek, 7800 ft., June 17, 1935, *Graham 9225.*

Mimulus glabratus utahensis Pennell See Mon. Acad. Nat. Sci. Phil. **1**: 123. 1935.

The single specimen cited shows flowers and immature capsules. Marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9819.*

Mimulus guttatus Fisch.

Common at mid-altitudes throughout the Basin. All of the specimens show flowers with immature capsules on the later numbers and mature capsules only on the August number.

Up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6525;* SW. of Moon Lake, 8100 ft., June 24, 1935, *Graham 9345;* W. side of Red Creek, 7500 ft., June 27, 1935, *Graham 9436;* Willow Springs, 9500 ft., July 11, 1935, *Graham 9592;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9865;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 10016.*

Mimulus Lewisii Pursh

Collected only among rocks at the margin of a glacial Alpine Zone lake in the Uinta Mts. The specimen shows flowers and developing capsules.

Chepeta Lake, 10,600 ft., Aug. 21, 1935, *Graham 10098.*

Mimulus primuloides Benth.

Gilbert's Basin, Uinta, Duchesne County, 11,000 ft., July 16, 1928, *Weight 125,* USFS 61053.

Orthocarpus luteus Nutt. OWL'S CLOVER

Whiterocks, 6000 ft., Sept. 14, 1914, *DeMoisy Jr. 157,* USFS18803; Dry Gulch, 8000 ft., Aug. 19, 1927, *Lambert 81,* USFS 59292.

Orthocarpus Tolmiei H. and A.

Occasional throughout the Basin at mid-altitudes. Both specimens are in flower.

Mountain Home-Tabiona road 4 mi. W. of Rock Creek, 8000 ft., June 25, 1935, *Graham 9364;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9483.*

Pedicularis centranthera Gray

The single specimen cited was collected near the Basin's southwest rim in the upper Juniper-Pinyon Zone; it shows both flowers and maturing capsules.

Head of dugway S. out of Cottonwood Creek, 6900 ft., July 6, 1935, *Graham 9515.*

Pedicularis groenlandica surrecta (Benth.) Piper LITTLE RED ELEPHANT, ELEPHANT HEAD or ELEPHANT FLOWER

Elephantella groenlandica (Retz.) Rydb., in part?
Pedicularis surrecta Benth.

Common in wet meadows of upper altitude near timber line in the Uinta Mts. The July specimens show flowers; the August numbers exhibit maturing, the September specimen opened, capsules.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6594;* between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 19, 1933, *Graham 8482;* lake meadow NE. of Paradise Park, 10,000 ft., Aug. 16, 1935, *Graham 10044;* Chepeta Lake, 10,600 ft., Aug. 20, 1935, *Graham 10072;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10236.*

Pedicularis Parryi Gray

Frequent in wet meadows near tree line in the Uinta Mts. All of the specimens show flowers with old capsules on *Graham 8434* and maturing capsules on *Graham 8548.*

Blanchard Park, head of Dry Fork Creek, 10,000 ft., July 5, 1933, *Graham 8401;* ridge NNW. of Paradise Park, 11,000 ft., July 8, 1933, *Graham 8434;* between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 19, 1933, *Graham 8487;* meadow along stream above Chain Lakes, 11,000 ft., July 20, 1933, *Graham 8548.*

Pedicularis Paysoniana Pennell See Bull. Torrey Bot. Club **61**: 446. 1934.

Infrequent at high altitudes in the Uinta Mts. Both specimens cited are in fruit.

Chepeta Lake, 10,600 ft., Aug. 21, 1935, *Graham 10097;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10216.*

Pedicularis procera Gray

Pedicularis Grayi A. Nels.

Collected only on the Tavaputs Plateau in Aspen woodland. Both specimens cited are in flower.

Middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9733;* head of Post Canyon, 8300 ft., July 31, 1935, *Graham 9951.*

Pedicularis racemosa Dougl.

Frequent in upper altitude forests of the Uinta Mts., where it is usually found on the floor of Lodgepole Pine forests. The July specimens are in flower; the later numbers show maturing capsules.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6605;* near small lakes E. of Paradise Park, 10,000 ft., July 6, 1933, *Graham 8408;* Lodgepole-Spruce woods NE. of Paradise Park, 10,000 ft., Aug. 16, 1935, *Graham 10043;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10228.*

Penstemon arenicola A. Nels.

Collected only in the Mixed Desert Shrub Zone along the Green River, along which it may have migrated from southern Wyoming, to which area it was previously considered confined (see Contr. U. S. Nat. Herb. **20**: 362. 1920). Dixon (1935), however, has recently reported it from the plateaus of south-central Utah. Both specimens cited are in flower.

Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9168;* Ainge Gulch, 5 mi. N. of Jensen, May 29, 1912, *Peterson s. n.*

Penstemon caespitosus subsp. **typicus** Keck See Bull. Torr. Bot. Club **64**: 363. 1937.

Penstemon caespitosus Nutt.

Frequent at mid-altitude particularly in Sagebrush areas of the Submontane Shrub Zone. All of the specimens are in flower.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6307;* Vernal-Manila road N. of Vernal, 6500 ft., June 19, 1933, *Graham 8154;* near Little Lake, 8300 ft., June 23, 1933, *Graham 8266;* on burned-over slope, S. side of White River, 2 mi. SE. of mouth of Wolf

Creek, Colo., 6000 ft., June 1, 1935, *Graham 9053;* among sage, 3 mi. SW. of Soldier Springs, E. of Strawberry reservoir, 7600 ft., June 19, 1935, *Graham 9286.*

Penstemon carnosus Francis W. Pennell, sp. nov.

Planta 3-4 dm. alta, glabra, glauca; folia carnosa, ovalia, obtusa apiculatave, brevi-petiolata; sepala 6-7 mm. longa, ovata, acuminata attenuatave, marginibus scariosa; corolla 17-22 mm. longa, antice rotundata, interne fere glabra, lobis paulo patentibus; anthera 2.5-3 mm. longa; staminodium distaliter latius, brevi-barbatum; capsula 8-9 mm. longa; semina 3 mm. longa.

Stems 3-4 dm. tall, glabrous, glaucous. Leaves fleshy-thickened, glabrous, glaucous; the basal and lowest cauline 3-5 cm. long, 2-3 cm. wide, oval, apiculate or obtuse, each cuneately narrowed to a short petiole; the cauline two or three pairs, oval, cordate at base, sessile or clasping. Thyrsus about half the height of the plant, composed of 5 to 9 fascicles; these glabrous, the peduncles less than 2 cm. long, the cymes nearly simple, each of about 5 flowers. Sepals 6-7 mm. long, ovate, acuminate to attenuate, with narrow, scarious, erose margins. Corolla 17-22 mm. long, the throat rather narrowly funnelform, rounded ventrally, the posterior lobes about 5 mm. long, united about ⅓ length, the anterior scarcely longer, all slightly spreading; corolla violet-blue, externally glabrous, internally slightly short-villose to glabrous over the anterior side of the orifice. Anthers 2.5-3 mm. long, gray, its cells horizontally divaricate, narrow, dehiscing throughout. Sterile filament reaching orifice or slightly exserted, near its broadened apex densely bearded with short yellow hairs. Capsule 8-9 mm. long, ovoid, sharply tipped, glabrous. Seeds 3 mm. long, turgid, sharply angled, ochraceous-brown.

TYPE, San Rafael Swell, Emery County, Utah, south of the limits of the Uinta Basin, at an altitude of 6000 feet, collected in flower June 6, 1932, *W. C. Cottam 5229,* in Herbarium of the Academy of Natural Sciences of Philadelphia; collected in flower in the Uinta Basin West of Willow Creek, Thorne's ranch, 5400 ft., May 23, 1935, *Graham 8963;* collected in fruit, in the Uinta Basin along Cottonwood Creek, at foot of dugway to the south, 6300 ft., July 6, 1935, *Graham 9511.*

Hillsides and breaks, at altitudes of 5400 to 6300 feet, nearly confined to the western slope of the Colorado River Valley, from the

Duchesne to the Escalante Rivers, eastern Utah. Flowering from late May to mid-June.

The following specimens of this new species in the Herbarium of the Philadelphia Academy are listed in alphabetical sequence of counties: Carbon: Price, *S. Flowers; Graham 9511.* Emery: *Cottam 5229.* Garfield: Escalante, *W. D. Stanton 1023.* Sevier: Salina Canyon, *Stanton 1025.* Uintah: *Graham 8963.*

In 1917, in agreement with the present writer[5] who was then associated with him at the New York Botanical Garden, the late Dr. P. A. Rydberg (1922 p. 1066) published *Penstemon pachyphyllus*, adopting a manuscript name of Asa Gray that accompanied the type of *P. nitidus major* Benth. at that institution. Gray's very appropriate name was based upon a collection made by Fremont in 1844 in the valley of the Duchesne River. Three years later I included this species in my "Scrophulariaceae of the Central Rocky Mountain States" (see Pennell 1920, p. 360) as applying to plants occurring widely over Utah.

Recently I have come to realize that, although specimens from this state, eastern Nevada, and northern Arizona are all but indistinguishable in vegetative aspect, there are differences in the flowers that mark a number of species, each of restricted range. The group must be further studied in the field, but now it may be permissible to call attention to the distinctness of at least the following members:

A. Lobes of corolla widely spreading, over half the length of the tube and throat; apex of sterile filament 0.5-1 mm. wide, densely bearded with long flexuous hairs.....*P. pachyphyllus*

AA. Lobes of corolla slightly spreading, less than half the length of the tube and throat; apex of sterile filament less than 0.5 mm. wide.

B. Sterile filament bearded with slender hairs that are much longer than the width of the filament-apex; corolla 15-18 mm. long; sepals 3-5 mm. long.....*P. congestus*

BB. Sterile filament bearded with hairs shorter than or scarcely longer than the width of the filament-apex; corolla 17-22 mm. long; sepals 6-7 mm. long.....*P. carnosus*

Penstemon pachyphyllus Gray is a beautiful species of the Uinta Basin of northeastern Utah, first adequately understood as a result

[5]All of the notes on this species are by its author, Francis W. Pennell.

of Dr. Graham's recent collections. *P. congestus*[6] occurs in southwestern Utah, and adjacent Arizona and Nevada.

Penstemon comarrhenus A. Gray

Infrequent at mid-altitudes throughout the Basin, especially in the Sub-montane Shrub Zone. All of the specimens are in flower. The species was also collected (*Graham 9637*) in Water Canyon on the south slope of the Book Cliffs.

Willow Springs, 9600 ft., July 10, 1935, *Graham 9544*, *Graham 9567;* ridge between Post and Florence Canyons, 8200 ft., July 29, 1935, *Graham 9913*.

Penstemon Fremontii Torr. and Gray

Common throughout the Basin at low altitudes. This and other low altitude members of the genus are locally called "Bluebell." All of the specimens are in flower except the April number, which shows only old capsules, and the late June, 1933, numbers, which show mature capsules. The species is new to Utah, having been known previously only from southern Wyoming and northwestern Colorado (see Contr. U. S. Nat. Herb. **20**: 339. 1920).

5 mi. NW. of Dinosaur Quarry, 5500 ft., April 25, 1933, *Graham 7523;* desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8293;* pass, head of Smith Wells Draw, 8000 ft., June 28, 1933, *Graham 8327;* Leota road near Highway US 40, 5000 ft., May 21, 1935, *Graham 8915;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6000 ft., May 31, 1935, *Graham 9037;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9097;* head of Deep Channel Creek, Colo., 6400 ft., June 4, 1935, *Graham 9117;* along road at Altonah, 7000 ft., June 22, 1935, *Graham 9295;* desert 5 mi. E. of Lapoint, 5700 ft., June 22, 1935, *Graham 9306;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Penstemon Grahami David D. Keck, sp. nov.

Herba perennis, 12-18 cm. alta; radicibus fibrillatis; caulibus paucis (1-3) pruinoso-puberulis; foliis crasso-coriaceis venosis subintegerrimis usque ad inflorescentiam glabris, imis ovato-lanceolatis obtusis plerisque 20-25 mm. longis 15-20 mm. latis petiolatis, caulinis oblongis

[6] *Penstemon congestus* (Jones) Pennell, comb. nov., based on *P. acuminatus congestus* Jones, (Proc. Calif. Acad. II. **5**: 714. 1895) from southwestern Utah.

amplexicaulibus vel subcordatis; thyrso folioso glandulosoviscoso; cymis (2-6 geminis) contractis paucifloris; calyce 7-9 mm. longo, lobis lanceolatis acutis plus minusve coriaceis anguste scarioso-marginatis; corolla 30-35 mm. longa 11-12 mm. lata pallide purpurea extus glandulosa, fauce e tubo proprio (10-14 mm. longo) subito ventricoso-ampliata limbo ringente vix longiore, labiis latis, superiori arcuato, inferiore patentissimo basi intus parce hirsuto; filamento sterili ultra faucem exserto apice incurvo insigniter dense et breviter undique fere ad basim aureo-barbato; capsula glabra.

Corolla "light to deep lavender," the lower lip striped with red-purple guide lines; longer pair of stamens exceeding the throat, the anther-sacs widely divaricate, fully explanate, almost as broad as long.

The type specimen, *Graham 7883*, is in flower; the other number shows both flowers and maturing capsules.

Talus slope, west side of Green River, south of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7883*, TYPE, in the Carnegie Museum Herbarium; bench west of Green River, north of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7916*.

This plant appears to be a closely restricted endemic of the Uinta Basin. It is surrounded by other species of its section in the genus—*P. dolius* Jones ex Pennell to the westward, *P. Moffatii* Eastw. to the south, and *P. Cleburnei* Jones and *P. eriantherus* Pursh (*P. cristatus* Nutt.) to the northward. However, the most distinctive features of *P. Grahami* are duplicated only in *P. miser* Gray, which occurs from eastern Nevada westward, and in all probability the relationship is more intimate between these two than between *P. Grahami* and those species of the section to which it is closer geographically.

Penstemon humilis Nutt.

Frequent at low or occasionally mid-altitudes throughout the Basin. All of the specimens show flowers, with capsules also on *Graham 6354*, *9282*, *9402*, and *10063*.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6354;* among Junipers, above Stanaker Draw, 6000 ft., June 7, 1933, *Graham 8117;* near Little Lake, 8300 ft., June 23, 1933, *Graham 8253;* burned-over slope, S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6500 ft., June 1, 1935, *Graham 9065;* N.-facing slope of E. side-canyon, 3 mi. above mouth of Red Creek, 6300 ft., June 19, 1935, *Graham 9282;* E. tributary of Red Creek, 7500 ft., June 26, 1935,

Graham 9402; on rocky bluff, E. side of Whiterocks Canyon, between Red Pine and Paradise Creeks, 10,000 ft., Aug. 17, 1935, *Graham 10063*.

Penstemon Osterhoutii Pennell

Occasional at low altitudes throughout the Basin. The specimens are all in flower. The species was known previously only from western Colorado and is here reported from Utah for the first time. *Graham 8921* is atypical, while the others approach *Penstemon pachyphyllus*.

East of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8921;* among Greasewood along Bitter Creek on Ouray-Watson road, 5500 ft., May 27, 1935, *Graham 9001;* shale slope near Cedar Springs, 10 mi. SW. of Maybell, Colo., 7000 ft., June 5, 1935, *Graham 9132*.

Penstemon pachyphyllus Gray ex Pennell

Common at low altitudes throughout the Basin. The species is believed to occur in Colorado and Arizona but Pennell (Contr. U. S. Nat. Herb. **20**: 360. 1920) cites specimens only from Utah and it is here treated as a Utah endemic. *Graham 7674* and *7773* are in bud; the other numbers are in flower, except *Graham 8161* which shows capsules. The species was also collected (*Graham 8105*) in Jackson Draw on the north slope of the Uinta Mts.

5 mi. NW. of Dinosaur Quarry, 5500 ft., May 16, 1933, *Graham 7674;* N. of Dinosaur Quarry, 5500 ft., May 18, 1933, *Graham 7713;* Cottonwood Springs, Little Mt., 6600 ft., May 22, 1933, *Graham 7773;* near spring, S. slope of Diamond Mt., 6000 ft., June 5, 1933, *Graham 8075;* along Vernal-Manila road N. of Vernal, 6500 ft., June 19, 1933, *Graham 8161;* E. tributary of Red Creek, 7500 ft., June 26, 1935, *Graham 9415;* 27 mi. up Indian Canyon road from Duchesne, 7800 ft., June 28, 1935, *Graham 9455*.

Penstemon procerus Dougl. ex Graham

Penstemon micranthus Nutt.

Infrequent at mid- and upper altitudes in the Uinta Mts. *Graham 9315* is in bud; the other numbers are in flower, with maturing capsules also on *Graham 10074*. The specimens represent a complex not here separated into the segregates which they may possibly represent.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6464;* between

E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 19, 1933, *Graham 8475;* SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9315;* flood-plain, West Fork of Lake Fork, 8000 ft., June 25, 1935, *Graham 9375;* Chepeta Lake, 10,600 ft., Aug. 20, 1935, *Graham 10074;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Penstemon strictus Benth.

Common at mid-altitudes throughout the Basin. All of the specimens are in flower with *Graham 6362, 9695,* and *9855* showing developing capsules as well. The species was also collected (*Graham 9636*) in Water Canyon on the south slope of the Book Cliffs. *Graham 9695, 9831,* and *9855* approach *Penstemon comarrhenus.*

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6321, Graham 6362;* W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9695;* middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9726, Graham 9743;* head of Post Canyon, 8000 ft., July 27, 1935, *Graham 9831, Graham 9855;* Post Canyon, 8100 ft., July 29, 1935, *Graham 9925;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Penstemon subglaber Rydb.

Frequent at mid-altitude in the Uinta Mts. *Graham 8249* is in bud; the other specimens are in flower. The specimen from Moon Lake is a strikingly narrow-leaved form.

W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6482;* near Little Lake, 8000 ft., June 23, 1933, *Graham 8249;* SE. slope of Mosby Mt., 8000 ft., July 3, 1933, *Graham 8356;* W. side of Red Creek, 7500 ft., June 27, 1935, *Graham 9450.*

Penstemon uintahensis Pennell

Occasional in upper altitudes of the Uinta Mts., especially in meadows near timber line. Both specimens are in flower, and represent the first collections of this Uinta Mt. endemic since Goodding collected the type at Dyer Mine in 1902. Dr. Frederick J. Hermann, who accompanied us on the Mt. Emmons trip, reported its occurrence at that locality in Rhodora **36:** 410. 1934.

Blanchard Park, head of Dry Fork Creek, 10,000 ft., July 5, 1933, *Graham 8391;* between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 19, 1933, *Graham 8479.*

Penstemon Watsonii A. Gray

Common at mid-altitudes, especially Sagebrush areas of the Submontane Shrub Zone, throughout the Basin. All of the specimens are in flower, with developing capsules also on *Graham 9928* and *9856*, the latter number representing a small form of the species. It was also collected (*Graham 8308*) in Pine Canyon and (*Graham 9633*) in Water Canyon, on the south slopes of the Book Cliffs.

Low ridge below Moon Lake, 8000 ft., June 25, 1935, *Graham 9384;* E. tributary of Red Creek, 7500 ft., June 26, 1935, *Graham 9406*, *Graham 9412;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9492;* ridge W. of head of Post Canyon, 8000 ft., July 27, 1935, *Graham 9836;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9856;* Post Canyon, 8100 ft., July 29, 1935, *Graham 9928*.

Penstemon Whippleanus A. Gray

Infrequent at upper altitudes throughout the Basin. *Graham 9590* is in bud; the other July numbers show flowers; the September specimens exhibit only matured capsules.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6600;* between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 19, 1933, *Graham 8476;* Rock Creek, 9200 ft., July 11, 1935, *Graham 9590;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10211*, *Graham 10220* (with *Swertia palustris*).

In addition to the species of Penstemon listed above, Pennell (1920) lists a specimen of *Penstemon dolius* Jones collected between Theodore [Duchesne] and Myton, *Jones s. n.*, and a specimen of *Penstemon scariosus* Pennell from the Uinta Mountains, *Longille 120*.

Scrophularia lanceolata Pursh FIGWORT

Infrequent throughout the Basin at mid-altitudes, especially in Aspen woods. The June number is in flower; *Graham 9687* shows flowers and developing capsules; *Graham 9885* exhibits mature capsules only.

W. side of Red Creek, 7500 ft., June 27, 1935, *Graham 9437;* W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9687;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9885*.

Verbascum Thapsus L. MULLEIN

This European introduction is only occasional throughout the Basin.

The September number shows flowers and maturing capsules; the other numbers represent vegetative specimens.

Mouth of Sand Wash, 5000 ft., May 29, 1933, *Graham 7950;* along road, Red Creek valley, 7500 ft., June 26, 1935, *Graham 9425;* along road, W. Fork of Duchesne River, 8000 ft., Sept. 8, 1935, *Graham 10254.*

Veronica americana Schwein. SPEEDWELL, BROOKLIME

Frequent at mid-altitudes throughout the Basin. The June and July numbers show flowers and varying stages of maturing capsules; the September specimen exhibits mature capsules only.

Davis Hollow, Taylor Mt., 8700 ft., Sept. 7, 1931, *Graham 7483;* SW. of Moon Lake, 8100 ft., June 24, 1935, *Graham 9353;* E. tributary of Red Creek, 7500 ft., June 26, 1935, *Graham 9394;* Willow Springs, 9500 ft., July 11, 1935, *Graham 9593;* W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9653;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9886.*

Veronica anagallis-aquatica L.

This Eurasian species is infrequent at low altitudes. The specimens all show a few flowers and maturing fruit.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6246;* Dry Fork, in Juniper Zone, 7000 ft., June 26, 1931, *Graham 6406;* Uinta River along Lapoint-Neola road, 5700 ft., June 22, 1935, *Graham 9304.*

Veronica humifusa Dickson

Infrequent at upper altitudes in the Uinta Mts. All of the specimens cited are in flower.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6606;* near small lake E. of Paradise Park, 10,000 ft., July 4, 1933, *Graham 8378;* meadow along stream above Chain Lakes, 11,000 ft., July 20, 1933, *Graham 8530* (with *Veronica Wormskjoldii*).

Veronica Wormskjoldii R. and S.

Common in wet meadows of the Spruce-Fir Zone or occasionally Alpine Zone of the Uinta Mts. The July specimens are in flower, with fruit of the preceding season on *Graham 6578a*; the later numbers show mature capsules.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6578a, Graham 6619;* between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft.,

July 19, 1933, *Graham 8494;* W. side of second and third Chain Lakes, 10,700 ft., July 22, 1933, *Graham 8599;* Lodgepole-Spruce woods NE. of Paradise Park, 10,200 ft., Aug. 16, 1935, *Graham 10035;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10232.* (See also *Veronica humifusa, Graham 8530*).

OROBANCHACEAE

Orobanche ludoviciana Nutt. BROOM-RAPE

Myzorrhiza ludoviciana (Nutt.) Rydb.

The single specimen cited, which shows only fruit of the preceding season, was collected in the upper Mixed Desert Shrub Zone.

Douglass Canyon, W. of Dinosaur Quarry, 5000 ft., April 28, 1933, *Graham 7556.*

Thalesia fasciculata (Nutt.) Britton CANCER ROOT

Aphyllon fasciculatum A. Gray

Orobanche fasciculata Nutt.

Occasional throughout low and mid-altitudes of the Uinta Mts., frequently among Sagebrush, with which it may be symbiotically associated. The May number shows dried flowers of the preceding season; the other specimens exhibit flowers of the present season with developing capsules also on the August number.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6314;* in sand of wash, N. of Skull Pass Quarry, 5000 ft., May 6, 1933, *Graham 7646;* between Paradise Park road and E. bluff of Whiterocks Canyon, 9800 ft., Aug. 17, 1935, *Graham 10059.*

PLANTAGINACEAE

Plantago eriopoda Torr.

The single specimen cited shows flowers and developing capsules.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6247.*

Plantago major L.

This European introduction occurs occasionally at low or mid-altitudes throughout the Basin. *Graham 9649* is in flower; the other numbers are in fruit.

W. side of Green River near Quarry "L," 4700 ft., June 22, 1931, *Graham 6201;* along irrigation ditch, W. of Vernal, 5300 ft., Sept. 4,

1931, *Graham 7432;* W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9649.*

Plantago Purshii R. and S.

Common at low altitudes throughout the Basin. The specimens all show various stages of anthesis and developing capsules.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6106;* desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8291;* Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9173;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.;* Uinta Basin, July 4, 1912, *Peterson s. n.*

RUBIACEAE

Galium bifolium S. Wats.

The single fruiting specimen cited is from the extreme west end of the Basin.

Under Aspens, Horse Creek, 7700 ft., June 18, 1935, *Graham 9255.*

Galium boreale L.

This Eurasian species is common throughout the Basin at a wide range of altitudes. *Graham 6439* and *9471* are in bud; the other numbers all show flowers, with fruit also on *Graham 10055.*

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6241;* S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6439;* in Sagebrush, SE. slope of Mosby Mt., 8000 ft., July 3, 1933, *Graham 8349;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9471;* W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9672;* Paradise Park, 10,000 ft., Aug. 16, 1935, *Graham 10055;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Galium Brandegei A. Gray

The following specimen is in the herbarium of F. J. Hermann at Ann Arbor, Michigan: third Chain Lake, 11,100 ft., July 21, 1933, *Hermann 5178* (also in Mo. Bot. Gard.).

Galium coloradense W. Wight

Infrequent at low altitudes throughout the Basin. *Graham 8957* is an immature specimen; Peterson's specimens show flowers, with fruit also on the May 30 specimen.

W. of Willow Creek, Thorne's ranch, 5400 ft., May 23, 1935, *Graham 8957;* Ainge Gulch, 5 mi. N. of Jensen, May 29, 1912, *Peterson s. n.;* NE. of Dinosaur Quarry, May 30, 1912, *Peterson s. n.*

Galium trifidum L. var. **subbiflorum** Wiegand

The single fruiting specimen cited was collected in mixed Lodgepole Pine and Spruce-Fir woods in the Uinta Mts.

Woods NE. of Paradise Park, 10,200 ft., Aug. 16, 1935, *Graham 10027.*

Galium triflorum Michx.

Collected only at mid-altitude in the Uinta Mts. The early July specimen shows flowers and immature fruit; the late July number exhibits mature fruit.

W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6503;* between sheep bridge, Uinta River, and Chain Lakes, 9000 ft., July 23, 1933, *Graham 8632.*

CAPRIFOLIACEAE

Lonicera involucrata (Richards.) Banks SWAMP HONEYSUCKLE,
Distegia involucrata (Richards.) Cockerell BEARBERRY

Common throughout the Basin at mid- and upper altitudes, especially along forest streams. The single May specimen is vegetative; the June and early July numbers, for the most part, show flowers; the later specimens show various stages of maturing berries.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6233;* up creek, N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6550;* Uinta River Canyon above Big Park, 7500 ft., May 31, 1933, *Graham 7985;* Blanchard Park, head of Dry Fork Creek, 10,000 ft., July 5, 1933, *Graham 8396;* near third Chain Lake, 11,000 ft., July 21, 1933, *Graham 8580;* W. side of Uinta River at sheep bridge, 8500 ft., July 23, 1933, *Graham 8626;* Horse Creek, 7700 ft., June 18, 1935, *Graham 9244;* Willow Springs, 9500 ft., July 10, 1935, *Graham 9574;* woods NE. of Paradise Park, 10,200 ft., Aug. 16, 1935, *Graham 10031;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10202;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Lonicera utahensis Wats.

The single specimen cited, collected under Alpine Firs on the steep north-facing slope of Rock Creek, shows only a few rather immature

fruits, but its vegetative characters leave little doubt of its true identity.

Rock Creek below Willow Springs, 9200 ft., July 11, 1935, *Graham 9584*.

Sambucus coerulea Raf. ELDERBERRY

Sambucus decipiens M. E. Jones
Sambucus ferax A. Nels.
Sambucus glauca auth.

Frequent at mid-altitudes throughout the Basin. *Graham 9369* is in bud; the other June specimens show flowers; the July numbers exhibit both flowers and developing berries. A specimen (*Graham 8087*) was also collected in Jackson Draw on the north slope of the Uinta Mts.

Juniper Zone below Moon Lake, 7500 ft., June 30, 1931, *Graham 6410;* W. side of W. Fork above mouth of E. Fork (Yellowstone) Creek, 7160 ft., June 25, 1935, *Graham 9369;* N. slope of E. side-canyon, 16 mi. by road up Indian Canyon from Duchesne, 6800 ft., June 28, 1935, *Graham 9460;* W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9699;* Post Canyon, 7800 ft., July 29, 1935, *Graham 9932*.

Sambucus melanocarpa Gray

Collected only in the extreme south and west ends of the Basin in the Aspen Zone. Both specimens cited are in flower.

Head of Horse Creek, 7800 ft., June 17, 1935, *Graham 9227;* Rock Creek, 9200 ft., June 11, 1935, *Graham 9608*.

Sambucus microbotrys Rydb.

Frequent at upper altitudes in the Uinta Mts. The June and early July specimens are in flower; the later numbers show maturing berries.

E. slope of Wolf Creek Pass, 9000 ft., June 16, 1933, *Graham 8134;* WNW. of Trout Creek Ranger Station, 10,000 ft., June 21, 1933, *Graham 8207;* Blanchard Park, head of Dry Fork Creek, 10,000 ft., July 5, 1933, *Graham 8398;* on cliff above Chain Lakes, 11,000 ft., July 20, 1933, *Graham 8561;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10214*.

Symphoricarpos occidentalis Hook.

Frequent at mid-altitude in the Uinta Mts. The June specimen is

in bud; the July numbers show flowers; the later specimens exhibit berries.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6239;* Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7372*, *Graham 7382;* Dry Fork, in Juniper Zone, 7000 ft., Sept. 5, 1931, *Graham 7449;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9817;* Uinta Basin, July 13, 1912, *Peterson s. n.*

Symphoricarpos rotundifolius Gray

Common throughout the Basin at mid-altitude, especially as an important secondary species of the Sub-montane Shrub Zone. It was also collected (*Graham 8313*) in Pine Canyon on the south slope of the Book Cliffs. *Graham 6332* and *9694* are atypical, with large leaves. Our specimens show the species to flower in June and early July and to fruit in August and September. At Baxter Pass we observed a chipmunk, hanging from the branches of this shrub, feeding on its ripened fruits.

Rydberg (Mem. N. Y. Bot. Gard. **1**: 371. 1900) states that his *S. vaccinioides* is intermediate between *S. oreophilus* A. Gray and *S. rotundifolius* A. Gray with the leaves and seeds of the former and the flowers of the latter. All northern Rocky Mountain plants he calls *S. vaccinioides*. However, the type of *S. vaccinioides* in the U. S. National Herbarium is as pubescent as many of *S. rotundifolius* in the same herbarium. None of our specimens have the smooth leaves and large funnelform flowers of *V. oreophilus*, but we do not here consider *S. vaccinioides* Rydb. nor *S. rotundifolius vaccinioides* A. Nels. distinct from *S. rotundifolius* Gray.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6332*, *Graham 6370*, *Graham 6382b;* Dry Fork, in Juniper Zone, 7000 ft., June 26, 1931, *Graham 6402;* W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6495;* Davis Hollow, Taylor Mt., 8700 ft., Sept. 7, 1931, *Graham 7491;* near Little Lake, 8300 ft., June 23, 1933, *Graham 8244;* E. side of Green River, Island Park, 5300 ft., June 11, 1935, *Graham 9198;* N.-facing slope of E. side-canyon, 3 mi. above mouth of Red Creek, 6300 ft., June 19, 1935, *Graham 9280;* E. tributary of Red Creek, 7500 ft., June 26, 1935, *Graham 9413;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9472;* Willow Springs, 9550 ft., July 10, 1935, *Graham 9570;* W. Fork of Douglas Creek, Colo., 7700 ft.,

July 16, 1935, *Graham 9694;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9900;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 10003;* Baxter Pass, Colo., 8300 ft., Aug. 24, 1935, *Graham 10163.*

Symphoricarpos utahensis Rydb.

The single specimen cited, from the southeast Basin rim, shows flowers and immature fruit.

W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9692.*

VALERIANACEAE

Valeriana edulis Nutt. VALERIAN, TOBACCO ROOT

A frequent plant of mid-altitudes throughout the Basin, often occurring among Sagebrush. All the specimens (except *Douglass s. n.*) are in flower and so lack the diagnostic fruit, but they otherwise seem to be referable to this species.

Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8200;* SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9327;* along W. Fork flood-plain near ridge just below Moon Lake, 8000 ft., June 25, 1935, *Graham 9374;* W. side of Red Creek, 7500 ft., June 27, 1935, *Graham 9443;* Willow Springs, 9550 ft., July 10, 1935, *Graham 9541;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Valeriana furfurascens A. Nels.

The specimen is in flower, and so lacks diagnostic fruit, but in its lax inflorescence and small flowers it is distinct from the above species and very probably referable to *V. furfurascens.*

Middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9715.*

Valeriana occidentalis Heller

Occasional in mid-altitude woodland meadows throughout the Basin. All of the specimens cited are in flower.

E. slope of Wolf Creek Pass, 9000 ft., June 16, 1933, *Graham 8142;* Trout Creek Ranger Station, 9300 ft., June 20, 1933, *Graham 8187;* head of Horse Creek, 7800 ft., June 17, 1935, *Graham 9223;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9481;* Rock Creek, 9200 ft., July 11, 1935, *Graham 9604.*

CAMPANULACEAE

Campanula petiolata A. DC. BELLFLOWER, HARE or BLUE BELL

Campanula rotundifolius, western authors

Frequent in the Uinta Mts. throughout a wide range of altitudes. Excepting *Graham 8577*, which is in bud, all the specimens show flowers, some on each sheet being in late anthesis.

Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7369;* cliff above third Chain Lake, 11,000 ft., July 20, 1933, *Graham 8545;* near third Chain Lake, 11,000 ft., July 21, 1933, *Graham 8577;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 9992;* woods NE. of Paradise Park, 10,200 ft., Aug. 16, 1935, *Graham 10030;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10209;* Petty Mt., 15 mi. N. of Mountain Home, 10,000 ft., Aug. 22, 1936, *Doutt 4344*.

Campanula uniflora L. ALPINE BELLFLOWER

The single specimen of this arctic-alpine Eurasian species cited, collected in the Alpine Zone of the Uinta Mts., shows flowers and immature fruit.

E. slope of Mt. Emmons, 12,000 ft., July 18, 1933, *Graham 8474b*.

COMPOSITAE

Achillea lanulosa Nutt. YARROW

Common throughout the Basin at mid-altitudes. The specimens show varying stages of anthesis. A specimen (*Graham 8309*) was also collected in Pine Canyon, on the south slope of the Book Cliffs.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6224;* S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6415;* Davis Hollow, Taylor Mt., 8700 ft., Sept. 7, 1931, *Graham 7476;* meadow-pasture NW. of Willow Springs, 9600 ft., July 10, 1935, *Graham 9548;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9873;* White River bottom, near Utah-Colorado state line, July 6, 1908, *Douglass s. n.*

Achillea lanulosa alpicola Rydb. ALPINE YARROW

Achillea alpicola Rydb.

Achillea subalpina Greene

The single specimen cited, collected near tree line in the Uinta Mts., is in flower.

Meadow along stream above Chain Lakes, 11,000 ft., July 20, 1933, *Graham 8522.*

Actinea acaulis arizonica (Greene) Blake

Tetraneuris arizonica Greene

Common throughout the Basin at a wide range of altitudes, but usually on exposed, rocky outcrops. The specimens show varying stages of anthesis.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6353;* bench near head of Sand Wash, 5300 ft., May 30, 1933, *Graham 7959, Graham 7966;* junction of Juniper and Aspen Zones, Uinta River Canyon, 7000 ft., June 2, 1933, *Graham 8048;* Vernal-Manila road N. of Vernal, 6500 ft., June 19, 1933, *Graham 8172;* near Little Lake, 8300 ft., June 23, 1933, *Graham 8257;* pass, head of Smith Wells Draw, 7500 ft., June 28, 1933, *Graham 8326;* Blanchard Park, head of Dry Fork Creek, 10,000 ft., July 5, 1933, *Graham 8406;* ridge NNW. of Paradise Park, 10,800 ft., July 8, 1933, *Graham 8436;* W. of Willow Creek, Thorne's ranch, 5400 ft., May 23, 1935, *Graham 8960;* Post Canyon, 8000 ft., July 27, 1935, *Graham 9841.*

Actinea acaulis lanigera (Daniels) Blake

Actinella lanata Nutt., not Pursh

Tetraneuris lanigera Daniels

Collected only in the Mixed Desert Shrub Zone of the central Basin, on Green River shales. Both specimens cited are in flower.

Upper Sand Wash, 5000 ft., May 26, 1933, *Graham 7842;* bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7921.*

Actinea acaulis simplex (A. Nels.) Macbr.

Tetraneuris simplex A. Nels.

The single flowering specimen cited was collected in the Mixed Desert Shrub Zone of the central Basin.

E. of Willow Creek, Thorne's ranch, 5500 ft., May 22, 1935, *Graham 8942.*

Actinea grandiflora (T. and G.) Kuntze

Actinella grandiflora T. and G.

Rydbergia grandiflora (T. and G.) Greene

Collected only in a rocky meadow above tree line in the Uinta Mts. The specimen shows both flowers and mature achenes.

Head of W. Fork of Whiterocks River, 12,000 ft., Aug. 21, 1935, *Graham 10115*.

Actinea Richardsonii (Hook.) Kuntze COLORADO RUBBER PLANT
Actinella Richardsonii (Hook.) Nutt.
Hymenoxys floribunda Cockerell
Picradenia Richardsonii Hook.

The specimen cited is in flower and was collected near the southernmost rim of the Basin. The species was also collected on the south slope of the Book Cliffs in Water Canyon (*Graham 9631*) and two miles north of Sunnyside (*Graham 9527*) where it was very common.

This species is poisonous to sheep, although they usually eat it only when hard pressed for food.

Rim of Range Creek, near Willow Springs, 9600 ft., July 12, 1935, *Graham 9621*.

Actinea Torreyana (Nutt.) Macbr.
Actinella Torreyana Nutt.
Tetraneuris Torreyana (Nutt.) Greene

Infrequent at low altitude throughout the Basin, especially on shale outcrops. The specimens are in flower.

N.-facing edge of Diamond Mt. plateau, 6500 ft., June 5, 1933, *Graham 8081;* five miles W. of Bitter Creek along Watson-Ouray road, 6300 ft., May 26, 1935, *Graham 8986*.

Agoseris aurantiaca (Hook.) Greene
Troximon aurantiacum Hook.

The single specimen cited, which is tentatively determined, and was collected near the Basin's southernmost rim, is in flower.

NW. of Willow Springs, 9600 ft., July 10, 1935, *Graham 9566*.

Agoseris elata (Nutt.) Greene
Stylopappus elatus Nutt.
Troximon Nuttallii A. Gray

The single specimen cited, collected near the Basin's southeast rim, is in fruit.

Middle fork of Stuart Creek, Colo., 7500 ft., July 18, 1935, *Graham 9742*.

Agoseris glauca (Pursh) D. Dietr.

Troximon glaucum Pursh

Infrequent in the Uinta Mts. at mid- and upper altitudes. The specimens cited are in late anthesis. *Graham 10109* and *Douglass s. n.* are tentatively determined.

Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7376;* above third Chain Lake, 11,000 ft., July 21, 1933, *Graham 8591;* Chepeta Lake, 10,600 ft., Aug. 21, 1935, *Graham 10109;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Agoseris gracilens (A. Gray) Greene

Troximon gracilens A. Gray

Both specimens show mature achenes and are questionably determined.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6367;* Vernal-Manila road N. of Vernal, 6500 ft., June 19, 1933, *Graham 8158.*

Agoseris gracilens Greenei (A. Gray) Blake

Agoseris graminifolia Greene

Agoseris Greenei Rydb.

Troximon gracilens Greenei A. Gray

The specimen cited, collected near the southernmost extension of the Tavaputs Plateau, shows flowers in late anthesis and mature achenes.

Post Canyon, 8000 ft., July 29, 1935, *Graham 9921.*

Agoseris taraxifolia (Nutt.) D. Dietr.

The following specimen is in the herbarium of F. J. Hermann at Ann Arbor, Michigan: near fourth Chain Lake, 11,200 ft., July 20, 1933, *Hermann 5138* (also in the U. S. Nat. Herb., Mo. Bot. Gard., and Gray Herb.).

In addition to the species of Agoseris listed above, several undetermined numbers are in our collections from the Basin. These include five from the Uinta Mts. (*Graham 8010, 8055, 8263, 8478,* and *8546, Graham 8478* being a dwarf species from near timber line), one (*Graham 9164*) from the central Basin, and two (*Graham 9488* and *9560*) from near the rim of the Tavaputs Plateau.

Anaphalis margaritacea var. **occidentalis** Greene PEARLY
Anaphalis occidentalis Heller EVERLASTING

The specimen cited is in early anthesis.

W. side of Uinta River at sheep bridge, 8500 ft., July 23, 1933, *Graham 8628.*

Antennaria anaphaloides Rydb.

The single specimen cited, collected in Aspen woodland, is in flower. Near Little Lake, 8500 ft., June 22, 1933, *Graham 8219.*

Antennaria aprica Greene

Infrequent in the Uinta Mts. at mid-altitude. The May specimen is in bud; the June number shows flowers.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6417;* Uinta River Canyon, above Big Park, 7500 ft., May 31, 1933, *Graham 7986.*

Antennaria corymbosa E. Nels.

Frequent in meadows near and above tree line in the Uinta Mts. The July numbers show flowers; the September specimen exhibits mature achenes.

E. side of Paradise Park, 10,000 ft., July 4, 1933, *Graham 8368;* SE. slope of Mt. Emmons, 11,300 ft., July 19, 1933, *Graham 8507;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10215.*

Antennaria dimorpha (Nutt.) T. and G.
Gnaphalium dimorphum Nutt.

Frequent in upper Mixed Desert Shrub and lower Juniper-Pinyon Zones, where it often forms a ground-cover, especially among Sagebrush. The May specimen shows developing, the June number matured, achenes.

Whiterocks Canyon, 7300 ft., May 23, 1933, *Graham 7813;* head of Deep Channel Creek, Colo., 6400 ft., June 4, 1935, *Graham 9126.*

Antennaria media Greene

The following specimen is in the herbarium of F. J. Hermann at Ann Arbor, Michigan: above timber line, SE. slope of Mt. Emmons, 11,340 ft., July 19, 1933, *Hermann 4998* (also in U. S. Nat. Herb.).

Antennaria microphylla Rydb.

Common throughout the Basin at mid-altitudes, especially in Sagebrush areas. The specimens show varying stages of late anthesis and maturing achenes; *Graham 6312* is questionably determined.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6312;* Uinta River along Lapoint-Neola road, 5700 ft., June 22, 1935, *Graham 9302;* SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9326;* NW. of Willow Springs, 9600 ft., July 10, 1935, *Graham 9559;* Post Canyon, 8000 ft., July 29, 1935, *Graham 9927.*

Antennaria rosea Greene

Frequent throughout the Basin at mid- and occasionally upper altitudes. The specimens show varying stages of developing achenes.

Up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6516;* above third Chain Lake, 11,000 ft., July 21, 1933, *Graham 8585;* Rock Creek, below Willow Springs, 9200 ft., July 11, 1935, *Graham 9597;* middle fork of Stuart Creek, Colo., 7500 ft., July 18, 1935, *Graham 9759;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Antennaria umbrinella Rydb.

Collected only in the locality cited; the specimens are in late anthesis.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6577, Graham 6584, Graham 6607.*

Aplopappus acaulis (Nutt.) Gray

Stenotus acaulis Nutt.

Infrequent at low altitudes throughout the Basin. It was also collected (*Graham 8111*) in Jackson Draw on the north slope of the Uinta Mts. The specimens cited are in anthesis.

On shale knoll, along Watson-Ouray road, 5 mi. W. of Bitter Creek, 6300 ft., May 26, 1935, *Graham 8988;* head of Deep Channel Creek, Colo., 6400 ft., June 4, 1935, *Graham 9111.*

Aplopappus acaulis var. **glabratus** D. C. Eaton

Frequent throughout the Basin in the Mixed Desert Shrub Zone, especially on rocky slopes. The specimens cited are in anthesis, except *Graham 6337,* which shows old, empty involucres.

Davis Hollow, Taylor Mt., 8500 (?) ft., June 24, 1931, *Graham 6337;* Asphalt Ridge, 4 mi. SW. of Vernal, 6000 ft., May 25, 1933, *Graham 7832;* W. of Willow Creek, Thorne's ranch, 5400 ft., May 23, 1935, *Graham 8965;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6000 ft., May 31, 1935, *Graham 9049.*

Aplopappus Nuttallii T. and G.

Eriocarpum grindelioides Nutt.

Sideranthus grindelioides (Nutt.) Britt.

Frequent throughout the Basin at low and occasionally mid-altitudes. The specimens cited all show maturing achenes, except the May number, which is in bud.

Dry Fork, in Juniper Zone, 7000 ft., June 26, 1931, *Graham 6396;* desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8298;* pass, head of Smith Wells Draw, 7500 ft., June 28, 1933, *Graham 8328;* E. of Willow Creek, Thorne's ranch, 5600 ft., May 22, 1935, *Graham 8950;* ridge W. of head of Post Canyon, 8000 ft., July 27, 1935, *Graham 9845.*

Arctium minus L. BURDOCK

The single fruiting specimen of this European species cited was collected near cultivated fields.

Along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7431.*

Arnica cordifolia Hook.

Frequent throughout mid- and upper altitude woodlands throughout the Basin. The specimens show varying stages of anthesis, with mature achenes also on the July 23 and September numbers.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6315;* WNW. of Trout Creek Ranger Station, 10,000 ft., June 21, 1933, *Graham 8206;* between sheep bridge, Uinta River, and Chain Lakes, 9000 ft., July 23, 1933, *Graham 8634;* SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9340;* Rock Creek, near Willow Springs, 9200 ft., July 11, 1935, *Graham 9587;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10234.*

Arnica foliosa Nutt.

Occasional in mid- or upper altitude woodlands. The specimens cited are in late anthesis.

Up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6515;* NE. of Paradise Park, 10,200 ft., Aug. 16, 1935, *Graham 10036.*

Arnica latifolia Bong.

The specimens cited, which are from upper altitude forests of the Uinta Mts., show varying degrees of anthesis; *Graham 6643, 6653,* and *8644* are tentatively determined.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6609, Graham 6620;* slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6643, Graham 6653;* between sheep bridge, Uinta River, and Chain Lakes, 9000 ft., July 23, 1933, *Graham 8644.*

Arnica mollis Hook.

Frequent at upper altitudes in the Uinta Mts. The specimens show varying stages of anthesis.

W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6471;* W. side of second and third Chain Lakes, 10,700 ft., July 22, 1933, *Graham 8602;* Chepeta Lake, 10,600 ft., Aug. 21, 1935, *Graham 10095.*

Arnica Parryi A. Gray

Painter's Basin, Duchesne County, 11,500 ft., July 16, 1928, *Weight 119,* USFS 60993.

Arnica pumila Rydb.

Graham 8361 was collected in an upper Lodgepole Pine Zone meadow of the Uinta Mts.; it is in flower. The Douglass specimen shows old flowers and maturing achenes and is tentatively determined.

E. side of Paradise Park, 10,000 ft., July 4, 1933, *Graham 8361;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Arnica sororia Greene

The single flowering specimen cited was collected in a meadow at timber line in the Uinta Mts.

SE. slope of Mt. Emmons, 11,300 ft., July 19, 1933, *Graham 8502.*

Artemisia biennis Willd.

The single specimen cited is in flower.

W. side of Green River, near Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7346.*

Artemisia cana Pursh

Common in certain parts of the Sub-montane Shrub Zone, especially in the western Uinta Mts., where, as at Moon Lake, and along Horse Creek in the west end of the Basin, it forms the dominant shrub just below the Aspens. The June specimen is vegetative; the other specimen is in flower and shows a cone gall on one of the branches.

Horse Creek, 7700 ft., June 18, 1935, *Graham 9268;* Vernal-Manila road, N. of Vernal, 8000 ft., Sept. 4, 1935, *Graham 10191.*

Artemisia dracunculoides Pursh

Occasional throughout the Basin at mid-altitudes, especially in the Sub-montane Shrub Zone. The specimens cited show varying stages of anthesis with the earliest July number in bud.

Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7395;* NW. of Willow Springs, 9600 ft., July 10, 1935, *Graham 9553;* middle fork of Stuart Creek, Colo., 7500 ft., July 18, 1935, *Graham 9728;* Post Canyon, 8000 ft., July 29, 1935, *Graham 9906.*

Artemisia frigida Willd. MOUNTAIN SAGEBRUSH

The single specimen cited, which is in bud, was collected near the southeast Basin rim in the Mixed Desert Shrub Zone.

Middle fork of Stuart Creek, Colo., 7500 ft., July 18, 1935, *Graham 9748.*

Artemisia gnaphalodes Nutt.

The single specimen cited, which was collected on the dry, stony slope of a wash and shows old, empty involucres, represents a form of the species.

Willow Creek, 2 mi. above Thorne's ranch, 5300 ft., June 29, 1933, *Doutt 891.*

Artemisia ludoviciana Nutt.

The single specimen cited, collected in a Uinta Mt. canyon, is in bud.

Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 10001.*

Artemisia mexicana Willd.

The single specimen cited, which is in early anthesis, was collected in the central Basin; it is tentatively determined.

W. side of Green River near Quarry "L," 4700 ft., Aug. 29, 1931, *Graham 7310.*

Artemisia Michauxiana Bess.

The flowering specimens cited were collected near timber line in the Uinta Mts.

Slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6657;* on cliff above third Chain Lake, 11,000 ft., July 20, 1933, *Graham 8542.*

Artemisia nova A. Nels. SMALL SAGEBRUSH

Common in the central Uinta Mts. in the Sub-montane Shrub Zone where, as north of Vernal, it forms the dominant shrub above the

Junipers. It may be abundant also among the Junipers themselves or extend upward into open areas of the lower forested zones. It is sometimes locally called "Curly Sage." The September number is in flower; the other specimens show empty bracts of the preceding season.

Davis Hollow, Taylor Mt., 8700 ft., Sept. 7, 1931, *Graham 7469;* Cottonwood Springs, Little Mt., 6600 ft., May 22, 1933, *Graham 7770;* near Brush Creek along Iron Springs road, 8500 ft., June 23, 1933, *Graham 8276.*

Artemisia pygmaea A. Gray

The single vegetative specimen cited was collected on a light-colored shale knoll in the lower Juniper-Pinyon Zone.

Along Watson-Ouray road 5 mi. W. of Bitter Creek, 6300 ft., May 26, 1935, *Graham 8984.*

Artemisia scopulorum A. Gray

Frequent in rocky meadows of the upper forests or Alpine Zone of the Uinta Mts. The species is considered fine summer feed for sheep. Both specimens cited are in flower.

Ridge NNW. of Paradise Park, 11,500 ft., July 8, 1933, *Graham 8429;* between Paradise Park and Chepeta Lake, 10,300 ft., Aug. 20, 1935, *Graham 10089.*

Artemisia spiciformis Osterhout

The single flowering specimen cited was collected on the east slope of Wolf Creek Pass at the northwest Basin rim, where it was the dominant shrub over an area several acres in extent.

East side of Wolf Creek Pass, 9400 ft., Sept. 8, 1935, *Graham 10257.*

Artemisia spinescens D. C. Eaton BUD SAGE, BUD SAGEBRUSH, BUD BRUSH

Picrothamnus desertorum Nutt., not *Artemisia desertorum* Spreng.

Common throughout the Mixed Desert Shrub Zone, especially in the Atriplex-Tetradymia Association where it is often a very important secondary species. *Graham 6132* and *Peterson s. n.* are vegetative specimens; the other numbers show flowers.

Between Green River and Quarry "L," 4700 ft., June 20, 1931, *Graham 6132;* E. of Dinosaur Quarry, 5000 ft., April 29, 1933, *Graham 7564;* Skull Pass Quarry, 5000 ft., May 5, 1933, *Graham 7610;* Orchid (Mud) Springs Canyon, 5000 ft., May 20, 1933, *Graham 7760;* desert 9 mi. SSE. of Vernal, 5000 ft., May 2, 1935, *Graham 8745;* N. side of

White River, 4 mi. NE. of mouth of Evacuation Creek, 5300 ft., May 7, 1935, *Graham 8781;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Artemisia tridentata Nutt. SAGEBRUSH, BLACK SAGE

Common throughout the Basin in the Sub-montane Shrub Zone where it is often the dominant shrub. It also occurs in the upper Mixed Desert Shrub Zone and may sometimes be found scattered through the Juniper-Pinyon Zone, and on dry, exposed ridges it reaches high into the Aspen Zone. On certain parts of the Tavaputs Plateau it is the dominant plant at 10,000 feet, but it was not observed at such a high elevation in the Uinta Mts. *Graham 8952, 9291, 9362,* and *9615* are vegetative specimens, the first showing also a large hairy gall; the remaining numbers show varying stages of anthesis, the June and July specimens for the most part being in bud.

W. side of Green River near Quarry "L," 4700 ft., June 22, 1931, *Graham 6215;* W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6481;* Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7398;* Dry Fork, in Juniper Zone, 7000 ft., Sept. 5, 1931, *Graham 7462;* Davis Hollow, Taylor Mt., 8700 ft., Sept 7, 1931, *Graham 7473;* along irrigation ditch, Willow Creek above Thorne's ranch, 5400 ft., May 23, 1935, *Graham 8952;* S. end of Strawberry reservoir, 7500 ft., June 19, 1935, *Graham 9291;* W. side of Rock Creek, between Mountain Home and Tabiona, 75-7800 ft., June 25, 1935, *Graham 9362;* E. rim of Range Creek, near Willow Springs, 9600 ft., July 12, 1935, *Graham 9615;* head of Hill Creek, 8500 ft., July 31, 1935, *Graham 9938;* Bitter Creek, 3 mi. E. of Utah-Colorado state line, 7800 ft., Aug. 30, 1935, *Graham 10168;* Dry Run, Red Bluff Wash, Dragon-Vernal road between White and Green Rivers, June 27, 1908, *Douglass s. n.*

Aster adscendens Lindl.

Frequent throughout the Basin at low, mid- and occasionally upper altitudes. The specimens show varying stages of anthesis, with mature achenes on most of the later numbers.

Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7385, Graham 7404;* along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7430;* Davis Hollow, Taylor Mt., 8700 ft., Sept. 7, 1931, *Graham 7477, Graham 7478;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9780, Graham 9783;* Bitter Creek, 3 mi. E. of Utah-Colorado state line, 7800 ft., Aug. 30, 1935,

Graham 10177; Vernal-Manila road N. of Vernal, 8000 ft., Sept. 4, 1935, *Graham 10192;* Yellowstone (E. Fork of Lake Fork) Creek, 12 mi. N. of Mountain Home, 7800 ft., Aug. 18, 1936, *Doutt 4343;* Petty Mt., 15 mi. N. of Mountain Home, 10,000 ft., Aug. 22, 1936, *Doutt 4348.*

Aster Eatoni (Gray) Howell

Brachyactis hybrida Greene

Collected only at the locality cited. Both specimens are in flower, and *Graham 7352* is tentatively determined.

W. side of Green River near Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7352, Graham 7358.*

Aster glabriusculus (Nutt.) T. and G.

Xylorrhiza glabriuscula Nutt.

The single flowering specimen cited was collected in the east end of the Basin.

S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9100.*

Aster glaucodes Blake

Aster glaucus T. and G., not Nees
Eucephalus glaucus Nutt.

Infrequent at mid-altitude in the Uinta Mts. The July number is in bud; the other numbers are in late anthesis, with maturing achenes.

W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6499;* in Lodgepole burn between Paradise Park road and E. bluff of Whiterocks Canyon, 9800 ft., Aug. 17, 1935, *Graham 10068;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Aster leucanthemifolius Greene

Machaeranthera canescens D.C. Eaton
Machaeranthera commixta Greene
Machaeranthera leptophylla Rydb.
Machaeranthera leucanthemifolia Greene

Common throughout the Basin at low and mid-altitudes. The specimens show varying stages of anthesis, except *Graham 6674,* a rather glanduliferous plant which shows only old, empty involucres of the preceding season.

Dinosaur Quarry, 5000 ft., July 6, 1931, *Graham 6674;* W. side of Green River near Quarry "L," 4700 ft., Aug. 29, 1931, *Graham 7321a;*

Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7394;* Dry Fork, in Juniper Zone, 7000 ft., Sept. 5, 1931, *Graham 7460;* Davis Hollow, Taylor Mt., 8700 ft., Sept. 7, 1931, *Graham 7468;* ridge W. of head of Post Canyon, 8000 ft., July 27, 1935, *Graham 9848;* Post Canyon, 8000 ft., July 29, 1935, *Graham 9912;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 9990;* Vernal-Manila road N. of Vernal, 7400 ft., Sept. 4, 1935, *Graham 10185.* (See also *Chrysopsis villosa*, *Graham 9914*).

Aster leucelene Blake HEATH ASTER

Aster ericaefolius Rothrock
Leucelene ericoides (Torr.) Greene

The specimens cited are in flower. The species was also collected (*Graham 8114*) on the north slope of the Uinta Mts., in Jackson Draw, and on the south slope of the Book Cliffs (*Graham 8310*) in Pine Canyon.

Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9163;* NE. of Dinosaur Quarry, near Jensen, May 30, 1912, *Peterson s. n.;* Red Creek, 2 mi. N. of Fruitland, 6700 ft., Aug. 14, 1936, *Doutt 4316.*

Aster rubrotinctus Blake

Machaeranthera latifolia A. Nels.
Machaeranthera paniculata A. Nels.
Machaeranthera rubricaulis Rydb.

The single specimen cited, collected on the southeast Basin rim, is in late anthesis.

One mile W. of Baxter Pass, Colo., 8300 ft., Aug. 29, 1935, *Graham 10156.*

Aster venustus Jones WOODY ASTER

Xylorrhiza venusta (Jones) Heller

Frequent in rocky situations at low altitude in the central Basin. The specimens all show flowers with developing achenes.

Aster Parryi A. Gray of Wyoming, a species closely related to *A. venustus*, is poisonous to sheep, and it is possible that the latter species may also be harmful.

Bad lands N. of Skull Pass Quarry, 5000 ft., May 9, 1933, *Graham 7647;* along Brush Creek W. of Dinosaur Quarry, 5000 ft., May 16, 1933, *Graham 7678;* N. of Dinosaur Quarry, 5500 ft., May 18, 1933, *Graham 7717;* Douglass Canyon, W. of Dinosaur Quarry, 5000 ft.,

May 19, 1933, *Graham 7730;* Skull Pass Quarry, 5000 ft., May 18, 1933, *Graham 7823;* bench W. of Green River, S. of mouth of Sand Wash, 5000 ft., May 29, 1933, *Graham 7949;* bench W. of Green River, S. of Uteland Butte, 4800 ft., June 16, 1935, *Graham 8883;* S. of Red Bluff Wash, May 24, 1908, *Douglass s. n.*

Bahia ourolepis Blake See Proc. Biol. Soc. Wash. **35**: 175. 1922.

Common throughout the central Basin in the Mixed Desert Shrub Zone. The species is endemic to eastern Utah. The May specimen is in bud; the other numbers show flowers and mature achenes.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6097;* flat between Ouray and Quarry "L," 4700 ft., June 21, 1931, *Graham 6178;* talus slope, S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7873;* desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8296, Graham 8304;* desert 5 mi. E. of Lapoint, 5700 ft., June 22, 1935, *Graham 9308;* Uinta Basin, June 9, 1912, *Peterson s. n.;* Ainge Gulch, W. of Dinosaur Quarry, June 17, 1912, *Douglass s. n.* (with *Crepis glauca*, q.v.).

Balsamorhiza hirsuta var. **neglecta** Sharp See Ann. Mo. Bot. Gard. **22**: 139. 1935.

Occasional at mid-altitudes in the Uinta Mts. *Graham 6356* shows old flowers and maturing achenes; the other numbers are in flower.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6356;* Cottonwood Springs, Little Mt., 6600 ft., May 22, 1933, *Graham 7779;* near Little Lake, 8300 ft., June 23, 1933, *Graham 8259.*

Balsamorhiza sagittata (Pursh) Nutt. BALSAMROOT

Infrequent at mid- or low altitudes, especially in Sagebrush and Juniper areas of the east end of the Basin. The June specimen is in flower, the July number shows maturing achenes.

SE. slope of Mosby Mt., 8000 ft., July 3, 1933, *Graham 8359;* burned-over slope, S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6500 ft., June 1, 1935, *Graham 9072.*

Brickellia grandiflora (Hook.) Nutt.

Coleosanthus grandiflorus (Hook.) Kuntze

The single specimen cited, from a deep canyon on the south slope of the Uinta Mts., shows maturing achenes.

Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 10019.*

Brickelia oblongifolia var. **linifolia** (D. C. Eaton) Robinson
Brickelia linifolia D. C. Eaton
Coleosanthus linifolius (D. C. Eaton) Kuntze

The single specimen cited shows mature achenes.

Flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6139.*

Brickellia scabra (Gray) A. Nels.
Brickellia microphylla scabra Gray
Coleosanthus scaber (Gray) Greene

Collected only in the central Basin at low altitude. *Peterson s. n.* is a vegetative specimen; the other number shows old, empty involucres.

Ouray, 5000 ft., June 22, 1933, *Doutt 877;* White River, June 25, 1912, *Peterson s. n.*

Chaenactis alpina (A. Gray) Jones
Chaenactis Douglasii alpina A. Gray
Chaenactis nevadensis (Kellogg) A. Gray

The single specimen cited, which is in flower, was collected on a rocky slope in the Alpine Zone of the Uinta Mts.

E. slope of Mt. Emmons, 11,600 ft., July 18, 1933, *Graham 8467.*

Chaenactis Douglasii (Hook.) H. and A.
Hymenopappus Douglasii Hook.

Common throughout the Basin at low and mid-altitudes, particularly among Sagebrush. For the most part, the May specimens are in anthesis; the later numbers show maturing and matured achenes.

Flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6143, Graham 6144;* Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6325, Graham 6360;* bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7900;* Vernal-Manila road N. of Vernal, 6500 ft., June 19, 1933, *Graham 8168;* E. tributary of Red Creek, 7500 ft., June 26, 1935, *Graham 9400;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9462;* middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9720;* ridge W. of head of Post Canyon, 8000 ft., July 27, 1935, *Graham 9830;* Red Bluff Wash, between White and Green Rivers, May 27, 1908, *Douglass s. n.;* Devil's Play Ground, between White and Green Rivers, June 23, 1908, *Douglass s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.;* Ainge Gulch, W. of Dinosaur Quarry, June 17, 1912, *Douglass s. n.*

Chaenactis Stevioides H. and A..

Frequent throughout the Basin in the Mixed Desert Shrub Zone. The specimens show varying stages of anthesis and maturing achenes.

Talus slope, S. of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7878;* Greasewood flat above marsh, mouth of Ashley Creek, 4750 ft., May 30, 1935, *Graham 9015;* Red Wash above Island Park, 5200 ft., June 10, 1935, *Graham 9179;* Ainge Gulch, 5 mi. N. of Jensen, May 29, 1912, *Peterson s. n.;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.;* Uinta Basin, June 26, 1912, *Peterson s. n.*

Chrysopsis villosa (Pursh) Nutt. GOLDEN ASTER

Common throughout the Basin at low and occasionally mid-altitudes. The specimens all show varying stages of flowers and maturing achenes. The species was also collected (*Graham 8109*) in Jackson Draw, on the north slope of the Uinta Mts., and (*Graham 9704*) at the head of East Salt Creek on the south slope of the Book Cliffs. *Graham 7463* represents a form of the species.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6268;* Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6330;* Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7406;* Dry Fork, in Juniper Zone, 7000 ft., Sept. 5, 1931, *Graham 7448, Graham 7463;* Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9174, Graham 9178;* middle fork of Stuart Creek, Colo., 7500 ft., July 18, 1935, *Graham 9752;* ridge between Post and Florence Canyons, 8200 ft., July 29, 1935, *Graham 9914;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 10008;* Vernal-Manila road N. of Vernal, 7400 ft., Sept. 4, 1935, *Graham 10186;* White River, June 26, 1912, *Peterson s. n.;* Yellowstone (East Fork of Lake Fork) Creek, 12 mi. N. of Mountain Home, 7800 ft., Aug. 18, 1936, *Doutt 4340.*

Chrysothamnus depressus Nutt.

The single fruiting specimen cited was collected among Pinyons and Junipers in the east-central part of the Basin.

10 mi. S. of Rangely, Colo., 6400 ft., Aug. 31, 1935, *Graham 10179.*

Chrysothamnus Greenei filifolius (Rydb.) Hall and Clements

The single flowering specimen cited was collected on the Tavaputs Plateau.

Horse Corn Canyon, W. tributary of Hill Creek, 10 mi. from mouth, 6800 ft., July 26, 1935, *Graham 9824*.

Chrysothamnus lanceolatus Nutt.

Chrysothamnus viscidiflorus lanceolatus Hall and Clements

Occasional throughout the Basin at mid-altitudes. The specimens cited are all non-typical. *Graham 9678* is in bud; *Graham 9939* shows empty involucres; the other numbers show flowers and maturing achenes.

Davis Hollow, Taylor Mt., 8700 ft., Sept. 7, 1931, *Graham 7490;* W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9678;* head of Hill Creek, 8500 ft., July 31, 1935, *Graham 9939;* Bitter Creek, 3 mi. E. of Utah-Colorado state line, 7800 ft., Aug. 30, 1935, *Graham 10173*.

Chrysothamnus nauseosus consimilis (Greene) Hall and Clements

Chrysothamnus consimilis Greene

Chrysothamnus pinifolius Greene

Collected only at low altitude in the central Basin. The specimens all show empty involucres; *Doutt 882* is questionably determined.

Between Green River and Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7323*, *Graham 7327;* Pariette Bench, 12 mi. SW. of Ouray, 5000 ft., June 22, 1933, *Doutt 882*.

Chrysothamnus nauseosus graveolens (Nutt.) Hall and Clements

Chrysothamnus graveolens (Nutt.) Greene

Frequent at low altitude throughout the Basin, especially in stream bottoms. *Douglass s. n.* is in bud; *Graham 8317* shows empty involucres of the preceding season; the other numbers show flowers and maturing achenes.

Near head of Smith Wells Draw, SW. of Myton, 7500 ft., June 28, 1933, *Graham 8317;* Chandler Canyon, 6000 ft., Aug. 3, 1935, *Graham 9977;* Vernal-Manila road N. of Vernal, 5700 ft., Sept. 4, 1935, *Graham 10184;* W. side of Green River, near Quarry "L," 4700 ft., Sept. 11, 1935, *Graham 10263;* Dry Run, Red Bluff Wash, Dragon-Vernal road between White and Green Rivers, June 27, 1908, *Douglass s. n.*

Chrysothamnus nauseosus salicifolius (Rydb.) Hall and Clements

Chrysothamnus salicifolius Rydb.

This Utah endemic is occasional at low or mid-altitudes throughout the Basin. *Graham 9773* is in bud; the other numbers show flowers

and maturing achenes. There is also a specimen (*Graham 8319*) representing an undetermined variety of *Chrysothamnus nauseosus.*

Middle fork of Stuart Creek, Colo., 7000 ft., July 19, 1935, *Graham 9773;* Greasewood flat of Evacuation Creek, 3 mi. S. of Dragon, 6000 ft., Aug. 28, 1935, *Graham 10146;* W. Fork of Duchesne River, 8000 ft., Sept. 8, 1935, *Graham 10256.*

Chrysothamnus Parryi attenuatus (Jones) Hall and Clements

Bigelovia Howardii attenuata Jones
Chrysothamnus attenuatus Rydb.

The single specimen cited, collected in a side-canyon off the Green River near the Basin's southernmost rim, shows flowers and maturing achenes.

Bottom of Florence Canyon, 6000 ft., Aug. 1, 1935, *Graham 9956.*

Chrysothamnus Parryi Howardii (Parry) Hall and Clements

Chrysothamnus Howardii (Parry) Greene

The single specimen cited, collected in the west end of the Basin, is in flower.

Red Creek, 2 mi. N. of Fruitland, 6700 ft., Aug. 16, 1936, *Doutt 4323.*

Chrysothamnus stenophyllus (Gray) Greene

Frequent in desert flats at low altitude throughout the Basin; in some sandy places it is the dominant species. All except *Graham 6156* and *10139* are tentatively determined. *Graham 8754* is a vegetative specimen; *8894* shows empty involucres of the preceding season; *10139* is in flower; the remaining numbers are in bud.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6120;* flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6156;* flat between Ouray and Quarry "L," 4700 ft., June 21, 1931, *Graham 6174;* W. side of Green River near Quarry "L," 4700 ft., May 4, 1935, *Graham 8754;* W. of Green River, S. of Uteland Butte, 4800 ft., May 16, 1935, *Graham 8894;* desert S. of White River Station, near mouth of Evacuation Creek, 5200 ft., Aug. 27, 1935, *Graham 10139;* Pariette Bench, 12 mi. SW. of Ouray, 5000 ft., June 22, 1933, *Doutt 881.*

Chrysothamnus viscidiflorus (Hook.) Nutt.

Frequent at low altitude in the central Basin. The specimens cited all show flowers and maturing achenes.

Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931,

Graham 7392; Dry Fork, in Juniper Zone, 7000 ft., Sept. 5, 1931, *Graham 7458;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 9999;* desert N. of Bonanza, 5500 ft., Aug. 27, 1935, *Graham 10143;* Leota Bench, 20 mi. S. of Vernal (flat above Quarry "L"), 5000 ft., Sept. 11, 1935, *Graham 10270.*

Chrysothamnus viscidiflorus linifolius (Greene) Hall and Clements
Chrysothamnus linifolius Greene

Both specimens cited are in bud and probably were collected in the Mixed Desert Shrub Zone.

White River bottom, near Utah-Colorado state line, July 6, 1908, *Douglass s. n.;* Uinta Basin, July 13, 1912, *Peterson s. n.*

Chrysothamnus viscidiflorus pumilus (Nutt.) Hall and Clements
Chrysothamnus pumilus Nutt.

Both specimens cited show flowers and developing achenes, and are questionably determined.

Leota bench, 20 mi. S. of Vernal (flat above Quarry "L"), 5000 ft., Sept. 11, 1935, *Graham 10268;* along Leota road off Highway US 40, 15 mi. S. of Vernal, 5000 ft., Sept. 11, 1935, *Graham 10271.*

Cirsium Drummondii Torr. and Gray

The single specimen cited, from the Uinta Mts., is in fruit. It is abnormal in having many heads crowded together at the top of the stem, and is tentatively determined.

W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6473.*

Cirsium Eatoni (A. Gray) B. L. Robins.

Frequent on rocky slopes near timber line in the Uinta Mts. The specimens are glabrous and very spiny and have woolly-ciliate involucral bracts; further study may prove them to represent a distinct entity. The specimens show varying stages of anthesis, with mature achenes on *Graham 10117.*

Slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6662;* ridge NW. of Paradise Park, 10,800 ft., July 8, 1933, *Graham 8420;* along stream above Chain Lakes, 11,000 ft., July 20, 1933, *Graham 8528;* NE. of Paradise Park, 10,200 ft., Aug. 16, 1935, *Graham 10037;* head of West Fork of Whiterocks River, 12,000 ft., Aug. 21, 1935, *Graham 10117.*

Cirsium lanceolatum (L.) Hill

Carduus lanceolatus L.

The single specimen cited is in flower.

Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7410.*

Cirsium megacephalum (Gray) Ckll.

Frequent at low altitude throughout the Basin. The species is apparently new to Utah, its range thus being extended slightly westward. *Graham 9087* is in bud; the other specimens show mature achenes.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6250;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9087;* Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9180;* Ainge Gulch, W. of Dinosaur Quarry, June 17, 1912, *Douglass s. n.*

Cirsium polyphyllum Rydb.

There is a specimen (*Hermann 5157*) of this species, collected on the south slope of the Uinta Mts. in July, 1933, in the herbarium of of Dr. Frederick J. Hermann at Ann Arbor, Michigan. It has apparently not before been recorded from Utah and represents a southward extension of range.

Cirsium pulchellum (Greene) Petrak

Carduus pulchellus Greene

Both specimens cited were collected in Sagebrush in the southern part of the Basin. They are in fruit, and are tentatively determined.

Cottonwood Creek, 6000 ft., July 6, 1935, *Graham 9510;* ridge W. of head of Post Canyon, 8000 ft., July 27, 1935, *Graham 9840.*

Cirsium pulcherrimum (Rydb.) Schum.

Carduus pulcherrimus Rydb.

The single flowering specimen cited was growing in Aspens and Sagebrush near the southeast Basin rim; it is tentatively determined.

Middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9735.*

Cirsium scariosum Nutt.

The single specimen cited is in mature fruit.

Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7374.*

Cirsium undulatum (Nutt.) Spreng.

Carduus undulatus Nutt.

Occasional throughout the Basin at mid-altitude. The specimens are in late anthesis. There is also an undetermined Cirsium (*Graham 9917*) somewhat like *C. undulatum.*

W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6470;* 10 mi. S. of Myton, 6000 ft., June 28, 1933, *Graham 8332;* middle fork of Stuart Creek, Colo., 7500 ft., July 18, 1935, *Graham 9756.*

Crepis acuminata Nutt.

Infrequent throughout the Basin at mid-altitude, especially in Sagebrush areas. *Graham 6331* is in fruit; the other numbers are in flower. It was also collected (*Graham 9635*) in Water Canyon, on the south slope of the Book Cliffs.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6331;* E. tributary of Red Creek, 7500 ft., June 26, 1935, *Graham 9396;* middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9723.*

Crepis glauca (Nutt.) Torr. and Gray

The single specimen cited is in fruit.

Ainge Gulch, W. of Dinosaur Quarry, June 17, 1912, *Douglass s. n.*

Crepis intermedia Gray

Infrequent at low and mid-altitudes. Both specimens cited show flowers and fruit.

SE. slope of Mosby Mt., 8000 ft., July 3, 1933, *Graham 8351;* Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9157.*

Crepis occidentalis Nutt.

The June specimen is in flower; the July number is in fruit.

Middle fork of Stuart Creek, Colo., 7500 ft., July 18, 1935, *Graham 9745;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Crepis scopulorum Coville

Infrequent at low and mid-altitudes throughout the Basin. Both specimens show flowers, with mature achenes also on *Graham 9043.*

S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6000 ft., May 31, 1935, *Graham 9043;* meadow-pasture NW. of Willow Springs, 9600 ft., July 10, 1935, *Graham 9542.*

Enceliopsis argophylla (D. C. Eaton) A. Nels.

The single specimen cited, collected in Kochia desert, is in flower.

Rocky S. edge of Leland Bench, 5000 ft., May 14, 1935, *Graham 8848*.

Enceliopsis nudicaulis (Gray) A. Nels.

Infrequent at low altitude in the central Basin. Both specimens cited are in flower.

Bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7917;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.*

Enceliopsis nutans (Eastw.) A. Nels.

Common at low altitude in the central Basin, where it often occurs on rocky or hard-packed soils. *Graham 7622* is in bud; the other numbers show flowers and developing achenes except *Peterson s. n.* (July 12) which shows naked receptacles.

Skull Pass Quarry, 5000 ft., May 6, 1933, *Graham 7622;* Skull Pass Quarry, 5000 ft., May 18, 1933, *Graham 7824;* near Pariette Mine, 10 mi. SE. of Myton, 5000 ft., May 26, 1933, *Graham 7858;* bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7920;* S. edge of Leland Bench, 5000 ft., May 14, 1935, *Graham 8849;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* Uinta Basin, July 12, 1912, *Peterson s. n.*

Erigeron acris L. var. **debilis** Gray

Erigeron jucundus Greene

The single specimen cited, collected in a wet meadow near timber line in the Uinta Mts., is in fruit.

Along stream above Chain Lakes, 11,000 ft., July 20, 1933, *Graham 8529*.

Erigeron argentatus Gray WYOMING DAISY

Wyomingia argentata (Gray) A. Nels.

Occasional on stony slopes at low altitude in the central Basin. The specimens cited are in flower, except the Peterson and Doutt numbers, which are in fruit; *Graham 7957* represents a depauperate form of the species.

Bench near head of Sand Wash, 5300 ft., May 30, 1933, *Graham 7957;* E. of Willow Creek, near schoolhouse, 5300 ft., May 24, 1935, *Graham 8972;* Uinta Basin, June 9, 1912, *Peterson s. n.;* Willow

Creek, 2 mi. above Thorne's ranch, 5300 ft., June 29, 1933, *Doutt 885*, *Doutt 887*.

Erigeron canadensis L. HORSEWEED

Leptilon canadense (L.) Britt.

Occasional in waste places of low altitude. The specimens cited are in fruit.

W. side of Green River, near Quarry "L," 4700 ft., Aug. 29, 1931, *Graham 7313;* Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7407;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 10011*.

Erigeron compositus incertus A. Nels.

The following specimen is in the herbarium of F. J. Hermann of Ann Arbor, Michigan: rocky SE. slope of Mt. Emmons, 12,300 ft., July 20, 1933, *Hermann 5145* (also in U. S. Nat. Herb.).

Erigeron compositus multifidus (Rydb.) Macbr. and Payson

Erigeron compositus Pursh

Erigeron multifidus Rydb.

Infrequent in the Uinta Mts. near timber line. The June specimen is in flower; the July number is in fruit.

NNW. of Trout Creek Ranger Station, 10,500 ft., June 21, 1933, *Graham 8215;* above third Chain Lake, 11,000 ft., July 20, 1933, *Graham 8559*.

Erigeron concinnus (H. and A.) Torr. and Gray

Common throughout the Basin at low altitude. The specimens show varying stages of anthesis.

Dry Fork, in Juniper Zone, 7000 ft., June 26, 1931, *Graham 6395;* Douglass Canyon, W. of Dinosaur Quarry, 5000 ft., May 19, 1933, *Graham 7728;* Asphalt Ridge S. of Lapoint road, 4 mi. SW. of Vernal, 6000 ft., May 25, 1933, *Graham 7835;* bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7938;* S. slope of Leland Bench, 5000 ft., May 13, 1935, *Graham 8825;* W. side of Duchesne River, 4 mi. above Ouray, 4800 ft., May 15, 1935, *Graham 8873;* W. of Willow Creek, near Thorne's ranch, 5400 ft., May 23, 1935, *Graham 8953;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6000 ft., May 31, 1935, *Graham 9035;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.*

Erigeron divergens Torr. and Gray

The single specimen cited is in flower.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6280.*

Erigeron Eatonii Gray

Common throughout the Basin at mid-altitude. The specimens show varying stages of anthesis.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6336;* near spring, S. slope of Diamond Mt., 6000 ft., June 5, 1933, *Graham 8077;* near Little Lake, 8500 ft., June 22, 1933, *Graham 8218;* burned-over slope, S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6500 ft., June 1, 1935, *Graham 9071;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9482;* meadow-pasture NW. of Willow Springs, 9600 ft., July 10, 1935, *Graham 9554.*

Erigeron Engelmanni A. Nels.

The specimens cited are in anthesis.

Junction of Juniper and Aspen Zones, Uinta River Canyon, 7000 ft., June 2, 1933, *Graham 8054;* Dry Run, Red Bluff Wash, Dragon-Vernal road between White and Green Rivers, June 27, 1908, *Douglass s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Erigeron flagellaris Gray

The single specimen cited, collected in Sagebrush along an old road, is in flower.

Post Canyon, 8000 ft., July 29, 1935, *Graham 9924.*

Erigeron glabellus Nutt.

Infrequent at low altitude. The specimens are in flower.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6243;* Dry Fork, in Juniper Zone, 7000 ft., June 26, 1931, *Graham 6394;* Uinta River along Lapoint-Neola road, 5700 ft., June 22, 1935, *Graham 9299.*

Erigeron leiomerus Gray

Frequent in rocky meadows near timber line in the Uinta Mts. The specimens are all in flower.

Slope above Brown Duck Lake, 11,000 ft., July 3, 1931, *Graham 6626;* ridge NNW. of Paradise Park, 11,300 ft., July 8, 1933, *Graham 8439;* meadow along stream above Chain Lakes, 11,000 ft., July 20,

1933, *Graham 8525;* cliff above third Chain Lake, 11,000 ft., July 20, 1933, *Graham 8543.*

Erigeron lonchophyllus Hook.

The single specimen cited is in flower.

Davis Hollow, Taylor Mt., 8700 ft., Sept. 7, 1931, *Graham 7482.*

Erigeron macranthus Nutt.

Collected only in Sub-montane Shrub on the Tavaputs Plateau near the south Basin rim. *Graham 9539* is in bud and tentatively determined; the other number is in flower.

Meadow-pasture NW. of Willow Springs, 9600 ft., July 10, 1935, *Graham 9539;* ridge W. of head of Post Canyon, 8000 ft., July 27, 1935, *Graham 9835.*

Erigeron salsuginosus (Richards.) Gray

Aster salsuginosus Richards.

Frequent at upper altitudes in the Uinta Mts. The specimens are in flower, except the August and September numbers, which are in fruit.

Up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6514;* E. slope of Mt. Emmons, 11,300 ft., July 19, 1933, *Graham 8504;* W. side of second and third Chain Lakes, 10,700 ft., July 22, 1933, *Graham 8601;* Chepeta Lake, 10,600 ft., Aug. 21, 1935, *Graham 10096;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10243.*

Erigeron simplex Greene

Erigeron uniflorus Greene

Common in upper altitude meadows of the Uinta Mts., especially in the Alpine Zone. The specimens are in flower.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6566;* E. side of Paradise Park, 10,000 ft., July 4, 1933, *Graham 8375;* between E. ridge of Mt. Emmons and Chain Lakes, 11,000 ft., July 19, 1933, *Graham 8497;* above Chain Lakes, 11,400 ft., July 20, 1933, *Graham 8572;* head of West Fork of Whiterocks River, 11,800 ft., Aug. 21, 1935, *Graham 10126.*

Erigeron speciosus (Lindl.) DC.

Occasional throughout the Basin at mid-altitude. The specimens show varying stages of anthesis and *Graham 6363* is questionably determined.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6363;*

Post Canyon, 7800 ft., July 28, 1935, *Graham 9875;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Erigeron subtrinervis Rydb.

Occasional throughout the Basin at mid-altitude. Both specimens are in flower.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6450;* W. Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9675.*

Erigeron ursinus D. C. Eaton

The single specimen cited is in flower.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6416.*

Erigeron viscidus Rydb.

The specimens cited, both from the Uinta Mts., are in flower, and *Graham 6468* is questionably determined.

W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6468;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Franseria acanthicarpa (Hook.) Cov.

Ambrosia acanthicarpa Hook.
Gaertneria acanthicarpa Britt.

The single specimen cited, collected near the central Basin, shows both flowers and fruit.

Leota Bench, 20 mi. S. of Vernal (flat above Quarry "L"), 5000 ft., Sept. 11, 1935, *Graham 10267.*

Franseria discolor Nutt.

Gaertneria tomentosa (Nutt.) Heller

Collected only in the area cited, on Green River lowland. The specimens are in flower, with fruit also on the August number. It has apparently not been reported before from Utah, which is the western limit of its range.

W. side of Green River, near Quarry "L," 4700 ft., June 18, 1931, *Graham 6077;* W. side of Green River, near Quarry "L," 4700 ft., June 22, 1931, *Graham 6190;* between Green River and Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7338.*

Gaillardia aristata Pursh

The flowering specimen cited was collected on the south slope of the eastern Uinta Mts.

Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Gaillardia flava Rydb.

The single specimen of this Utah endemic cited, collected in Desolation Canyon near the Basin's southern rim, shows flowers and developing achenes.

E. side of Green River, between Florence and Chandler Canyons, 4500 ft., Aug. 2, 1935, *Graham 9972.*

Gnaphalium chilense Spreng.

Whiterocks Lake, 10,500 ft., July 19, 1914, *DeMoisy Jr. 106,* USFS 18845.

Gnaphalium palustre Nutt.

The single specimen cited, collected in the central Basin, is in fruit.

W. side of Green River, near Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7348.*

Grindelia squarrosa var. **serrulata** (Rydb.) Steyermark GUM PLANT, RESIN WEED
Grindelia serrulata Rydb.

Frequent at low altitude in the central Basin. The specimens are in flower.

Between Green River and Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7337;* Uinta River W. of Lapoint, 5700 ft., July 23, 1933, *Graham 8607;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9782.*

Gutierrezia Sarothrae (Pursh) Britton and Rusby BROOM WEED, HORSE FEED
Gutierrezia diversifolia Greene
Solidago Sarothrae Pursh

Common throughout the Basin at low or occasionally mid-altitudes. The specimens are in anthesis except *Graham 7331,* which is in bud, and *6105* and *8295,* which show old, empty involucres of the preceding year.

Although only eaten when forage is scarce, this species may cause stock poisoning.

W. side of Green River, near Quarry "L," 4700 ft., June 18, 1931, *Graham 6105;* between Green River, and Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7331;* Dry Fork, in Juniper Zone, 7000 ft., Sept. 5, 1931, *Graham 7459;* Davis Hollow, Taylor Mt., 8700 (?) ft., Sept. 7, 1931, *Graham 7467;* desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8295;* Chandler Canyon, 6000 ft., Aug. 3, 1935, *Graham 9980;*

ridge SW. of Dragon, 7800 ft., Aug. 31, 1935, *Graham 10183;* Red Creek, 2 mi. N. of Fruitland, 6700 ft., Aug. 14, 1936, *Graham 4313*.

Helenium montanum Nutt. SNEEZEWEED

Collected only at the locality cited in the central Basin. The early specimen is in flower, the later one in fruit. A closely related species, *H. Hoopesii* Gray, not collected in the Basin, causes poisoning of sheep in some parts of Utah. It also gives a disagreeable flavor to milk.

W. side of Green River, near Quarry "L," 4700 ft., June 22, 1931, *Graham 6202;* W. side of Green River, near Quarry "L," 4700 ft., Aug. 29, 1931, *Graham 7315*.

Helianthella quinquenervis (Hook.) Gray

Helianthus quinquenervis Hook.

Frequent throughout the Basin at mid-altitude, especially in Submontane Shrub areas. The specimens are in flower, with maturing achenes on *Graham 9949*.

SE. slope of Mosby Mt., 8000 ft., July 3, 1933, *Graham 8341;* NW. of Willow Springs, 9600 ft., July 10, 1935, *Graham 9540;* middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9736;* head of Hill Creek, 8500 ft., July 31, 1935, *Graham 9949*.

Helianthella uniflora (Nutt.) Torr. and Gray

Helianthus uniflorus (Nutt.) Torr. and Gray

Collected only on the Tavaputs Plateau near the south Basin rim. Both specimens are in rather late anthesis.

Middle fork of Stuart Creek, Colo., 7600 ft., July 18, 1935, *Graham 9732;* Post Canyon, 8000 ft., July 29, 1935, *Graham 9923*.

Helianthus annuus L. SUNFLOWER

Helianthus lenticularis Dougl., not Nutt.

The single specimen cited of this American weed, native to Kansas, is in flower.

Along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7438*.

Helianthus aridus Rydb.

Infrequent at low altitude. The specimens cited are in flower.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6252;* Devil's Play Ground, between White and Green Rivers, June 23, 1908, *Douglass s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Helianthus lenticularis Nutt.

Infrequent at low altitude. Both specimens show flowers, with maturing achenes on the later number.

Desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8286;* in Greasewood, E. side of Green River, Island Park, 5000 ft., June 11, 1935, *Graham 9193.*

Helianthus Nuttallii Torr. and Gray

Helianthus utahensis A. Nels.

Infrequent at low altitude. Both specimens cited were collected in the environs of cultivated fields, and are in flower.

Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7377;* Willow Creek near Thorne's ranch, 5100 ft., Aug. 5, 1935, *Graham 9985.*

Helianthus petiolaris Nutt.

The specimens are in flower, with maturing achenes also on the later numbers. *Graham 7309* and *10260* represent a form or hybrid.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6118;* flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6146;* W. side of Green River, near Quarry "L," 4700 ft., Aug. 29, 1931, *Graham 7309;* W. side of Green River, near Quarry "L," 4700 ft., Sept. 11, 1935, *Graham 10260;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Hymenopappus eriopodus A. Nels.

Collected only near the Green River in the northeastern part of the Basin. Both specimens cited are in flower.

Red Wash, above Island Park, 5200 ft., June 10, 1935, *Graham 9144;* Ainge Gulch, W. of Dinosaur Quarry, June 17, 1912, *Douglass s. n.*

Hymenopappus lugens Greene

Occasional throughout the Basin at low or sometimes mid-altitudes. Both specimens cited are in flower, and *Graham 8300* is questionably named. There is also an undetermined number (*Graham 9457*) of Hymenopappus in the collection which resembles this species.

Desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8300;* pass, head of Smith Wells Draw, 7500 ft., June 28, 1933, *Graham 8321.*

Iva axillaris Pursh MARSH ELDER, BOZZELWEED, POVERTY WEED, SALT SAGE

Frequent throughout the central Basin at low altitude and oc-

casionally higher. The specimens show varying stages of anthesis, with maturing achenes on the later numbers.

W. side of Green River, near Quarry "L," 4700 ft., June 18, 1931, *Graham 6092;* flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6157;* W. side of Green River, near Quarry "L," 4700 ft., June 22, 1931, *Graham 6217*, *Graham 6219;* W. side of Green River, near Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7357;* Davis Hollow, Taylor Mt., 8700 (?) ft., Sept. 7, 1931, *Graham 7470;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9791.*

Iva xanthifolia Nutt. HORSEWEED, CARELESS WEED

Cyclachaena xanthifolia (Nutt.) Fresen.

The single specimen cited shows flowers and maturing achenes.

Along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7437.*

Kuhnia rosmarinifolia Vent. FALSE BONESET

The single specimen cited, collected in the southeastern part of the Basin, shows old flowers and maturing achenes. The species is here reported from Utah for the first time, its range being extended slightly northwestward.

Canyon W. of Dragon, 6500 ft., Aug. 28, 1935, *Graham 10148.*

Lactuca pulchella (Pursh) DC.

Sonchus pulchellus Pursh

Infrequent at low altitude; the specimens all show mature achenes.

Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7401*, *Graham 7403;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9807.*

Lactuca Scariola var. **integrata** Gren. and Godr.

Lactuca integrata A. Nels.

This European introduction was collected at low altitude in the vicinity of cultivation. Both numbers cited show mature achenes.

Along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7417;* marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9802.*

Lygodesmia grandiflora (Nutt.) Torr. and Gray

SKELETON WEED, PRAIRIE PINK

Scarce in the Basin, where it occurs at low altitude. The specimen

cited is in flower. It was also collected (*Graham 8339c*) in Pine Canyon, on the south slope of the Book Cliffs.

Red Wash above Island Park, 5200 ft., June 10, 1935, *Graham 9175*.

Lygodesmia juncea (Pursh) D. Don

The single specimen cited is in poor condition and is in bud.

E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.*

Malacothrix sonchoides (Nutt.) Torr. and Gray DESERT DANDELION

Common throughout the Basin at low altitude. The specimens all show flowers, with maturing achenes also on the June numbers.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6095;* flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6164;* flat between Ouray and Quarry "L," 4700 ft., June 21, 1931, *Graham 6187;* along road S. of Vernal, 5000 ft., June 23, 1931, *Graham 6293;* Greasewood flat above marsh, mouth of Ashley Creek, 4750 ft., May 30, 1935, *Graham 9014, Graham 9015a;* E. side of Green River, Island Park, 5000 ft., June 11, 1935, *Graham 9192;* Dry Run, Red Bluff Wash, Dragon-Vernal road between White and Green Rivers, June 27, 1908, *Douglass s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Malacothrix Torreyi Gray

Common throughout the central Basin at low altitude. The specimens show various stages of anthesis and *Peterson s. n.* is questionably determined.

Orchid (Mud) Springs Canyon, 5000 ft., May 20, 1933, *Graham 7762;* bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7909;* bench W. of Green River, S. of mouth of Sand Wash, 5000 ft., May 29, 1933, *Graham 7945;* bench W. of Green River, just S. of Uteland Butte, 4800 ft., May 16, 1935, *Graham 8879;* Leota road near Highway US 40, 15 mi. SW. of Vernal, 5000 ft., May 21, 1935, *Graham 8919;* NE. of Dinosaur Quarry, May 30, 1912, *Peterson s. n.*

Microseris nutans (Geyer) Sch. Bip.

Ptilocalais nutans (Geyer) Greene

Scorzonella nutans Geyer

The single specimen cited, from the east end of the Basin, shows flowers and maturing achenes.

S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6000 ft., May 31, 1935, *Graham 9047*.

Oxytaenia acerosa Nutt.

The single specimen cited is in early anthesis. This record extends the range of the species northward from the southern part of Utah, whence it probably migrated along the Green River. It is reputed poisonous to stock in winter.

Chandler Canyon, 6000 ft., Aug. 2, 1935, *Graham 9973*.

Parthenium alpinum (Nutt.) T. and G. var. **ligulatum** Jones

This is probably the second collection of this peculiar Uinta Basin endemic. It was originally collected "on nearly bare clayey and gravelly knolls on ridges" at Theodore (now Duchesne) by M. E. Jones, who described it in his Contributions to Western Botany, No. 13, p. 16, 1910. Our specimen is in flower, and was collected on a light-colored shale outcrop in lower Juniper-Pinyon Zone on the Tavaputs Plateau, seventy miles southwest of where Jones collected it.

5 mi. W. of Bitter Creek, along Watson-Ouray road, 6300 ft., May 26, 1935, *Graham 8991*.

Ptiloria exigua (Nutt.) Greene DESERT PINK, FLOWERING STRAW

Stephanomeria exigua Nutt.

The single specimen cited shows flowers and maturing achenes.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6107*.

Ptiloria tenuifolia (Torr.) Raf.

Frequent at low and mid-altitudes throughout the Basin. *Graham 6400* and *9905* show flowers; the other numbers exhibit maturing achenes.

Dry Fork, in Juniper Zone, 7000 ft., June 26, 1931, *Graham 6400;* ridge between Florence Canyon and head of Post Canyon, 8000 ft., July 29, 1935, *Graham 9905;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 10013;* bluffs between White and Green Rivers, July 1, 1908, *Douglass s. n.*

Rudbeckia occidentalis Nutt. NIGGER HEADS

The single specimen cited, from near the southeast Basin rim, is in very early anthesis.

West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9703*.

Senecio admirabilis Greene

The single specimen cited was collected in the Uinta Mts. at the northwest Basin rim.

Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10246.*

Senecio ambrosioides Rydb.

Infrequent at mid- and upper altitudes throughout the Basin. Both specimens cited show flowers and maturing achenes.

Head of Sawmill Canyon, near Baxter Pass, Colo., 8200 ft., Aug. 29, 1935, *Graham 10164;* along road above Mirror Lake, 10,500 ft., Sept. 8, 1935, *Graham 10258;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Senecio ambrosioides Rydb. var. **indivisus** J. M. Greenman, n. var.

Caules erecti vel ascendentes, 2-3 dm. alti; foliis oblanceolatis vel lanceolatis, 2-3 cm. longis, 0.5-2 cm. latis, inaequaliter dentatis, basi in petiolum contractis; involucris angustate campanulatis, 3-5 mm. diametro; floribus radii plerumque 5; floribus disci circiter 20; achaeniis glabris vel sparse hirtellis.

Stems erect or ascending 2-3 dm. high; leaves oblanceolate to lanceolate, 2-3 cm. long, 0.5-2 cm. broad, unequally dentate, narrowed at the base into a petiole; heads radiate; involucre narrowly campanulate, 3-5 mm. in diameter; ray-flowers mostly 5; disk-flowers about 20; achenes glabrous or sparingly hirtellous.

In Aspens, one mile west of Baxter Pass, Colo., 8300 ft., August 29, 1935, *Graham 10166,* TYPE, in the Carnegie Museum Herbarium.

This variety has its nearest relationship with *Senecio ambrosioides* Rydb., but differs from it in having unequally dentate instead of laciniate leaves, and in having smaller heads with fewer flowers in the head.

Senecio atratus Greene var. **milleflorus** (Greene) Greenman

Senecio milleflorus Greene

The single specimen cited, from near timber line in the Uinta Mts., is in flower.

Cliff N. of third Chain Lake, 11,000 ft., July 20, 1933, *Graham 8549.*

Senecio canus Hook.

The single specimen cited was collected on the southwestern Basin rim.

East rim of Range Creek, near Willow Springs, 9500 ft., July 12, 1935, *Graham 9623a.*

Senecio crassulus Gray

The single specimen cited, from the Spruce-Fir Zone at the west end of the Uinta Mts., is in fruit.

Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10226.*

Senecio cymbalarioides Nutt., not Nels.

The single specimen cited shows flowers and maturing achenes.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6318.*

Senecio cymbalarioides Nutt. var. **borealis** (Torr. and Gray) Greenm.

Senecio aureus var. *borealis* Torr. and Gray

The specimens cited show flowers and maturing achenes. *Graham 8454* is questionably determined.

W. slope of Marsh Peak, 11,500 ft., July 10, 1933, *Graham 8454;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Senecio Fremontii Torr. and Gray

The specimens cited, collected in the Alpine Zone of the Uinta Mts., are in flower.

E. slope of Mt. Emmons, 11,600 ft., July 18, 1933, *Graham 8457;* cliff above third Chain Lake, E. slope of Mt. Emmons, 11,000 ft., July 20, 1933, *Graham 8526;* head of West Fork of Whiterocks River, 12,000 ft., Aug. 21, 1935, *Graham 10124.*

Senecio Hookeri Torr. and Gray

Common at mid-altitude throughout the Basin, particularly in Sagebrush areas or Aspen woodland. It was also collected (*Graham 8097*) in Jackson Draw, on the north slope of the Uinta Mts. The specimens are in flower.

Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8012;* near Little Lake, 8500 ft., June 22, 1933, *Graham 8224;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6000 ft., May 31, 1935, *Graham 9041;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6500 ft., June 1, 1935, *Graham 9074a;* 10 mi. W. of Youghall, Colo., 7700 ft., June 5, 1935, *Graham 9131;* head of Horse Creek, 7800 ft., June 17, 1935, *Graham 9219;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9461.*

Senecio multicapitatus Greenman

The single specimen cited is in flower.

Dry Fork, in Juniper Zone, 7000 ft., Sept. 5, 1931, *Graham 7455.*

Senecio Purshianus Nutt.

Infrequent at mid- and upper altitudes throughout the Basin. The specimens are in flower, and *Graham 9551* is questionably determined.

E. slope of Mt. Emmons, 11,600 ft., July 18, 1933, *Graham 8461*, *Graham 8463;* meadow-pasture NW. of Willow Springs, 9600 ft., July 10, 1935, *Graham 9551*.

Senecio rubricaulis Greene

Senecio cymbalarioides Nels., not Nutt.

Common at mid- and sometimes upper altitudes throughout the Basin. It was also collected (*Graham 8311*) in Pine Canyon and (*Graham 9638*) in Water Canyon, on the south slope of the Book Cliffs. The specimens show flowers and developing achenes.

S. of Moon Lake, 8100 ft., June 30, 1931, *Graham 6414;* W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6469;* Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6581;* Big Park, Uinta River Canyon, 7500 ft., June 1, 1933, *Graham 8009;* lower edge of Aspen Zone, Uinta River Canyon, 7000 ft., June 2, 1933, *Graham 8049;* in Sagebrush near Little Lake, 8300 ft., June 23, 1933, *Graham 8256;* north of third Chain Lake, 11,000 ft., July 21, 1933, *Graham 8586;* in Aspens, SW. of Moon Lake, 8100 ft., June 23, 1935, *Graham 9335;* in Sagebrush, E. tributary of Red Creek, 7500 ft., June 26, 1935, *Graham 9408;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9490;* Post Canyon, 8000 ft., July 29, 1935, *Graham 9907*.

Senecio serra Hook.

The single specimen cited, collected in Aspens near the southeast Basin rim, is in bud.

West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9685*.

Senecio triangularis Hook.

Occasional at upper altitudes in the Uinta Mts. The specimens show flowers, except the September number, which exhibits mature achenes only; *Graham 6513* represents a slender form.

Up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6513;* W. side of second and third Chain Lakes, 10,700 ft., July 22, 1933, *Graham 8595;* Lodgepole-Spruce woods between Paradise Park and

Chepeta Lake, 10,200 ft., Aug. 20, 1935, *Graham 10085;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10235.*

Senecio uintahensis A. Nels.

Senecio Nelsonii uintahensis A. Nels.

Infrequent at mid- or occasionally upper altitude throughout the Basin. The specimens cited are in flower.

Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6613;* lower edge of Aspen Zone, Uinta River Canyon, 7000 ft., June 2, 1933, *Graham 8058;* Cottonwood Creek, 5700 ft., July 7, 1935, *Graham 9522;* middle fork of Stuart Creek, Colo., 7500 ft., July 18, 1935, *Graham 9754.*

Solidago altissima L.

Occasional at low or sometimes mid-altitudes. The specimens show maturing achenes.

W. side of Green River near Quarry "L," 4700 ft., Aug. 29, 1931, *Graham 7318;* Ashley Creek near mouth of Dry Fork, 6000 ft., Sept. 3, 1931, *Graham 7388, Graham 7405;* upper Stanaker Draw, 8, mi. N. of Vernal, 8700 ft., Sept. 7, 1931, *Graham 7466.*

Solidago canadensis L.

The single specimen cited, which shows flowers and maturing achenes, represents a form of the species.

Uinta River W. of Lapoint, 5700 ft., July 23, 1933, *Graham 8609.*

Solidago ciliosa Greene

Frequent at upper altitudes in the Uinta Mts., often in Alpine Zone meadows. The July specimens are in anthesis; the later numbers show maturing achenes.

W. of Moon Lake, 8100 ft., July 1, 1931, *Graham 6472;* E. slope of Mt. Emmons, 11,600 ft., July 18, 1933, *Graham 8462;* N. of third Chain Lake, 11,000 ft., July 20, 1933, *Graham 8544;* middle fork of Whiterocks River, 10,600 ft., Aug. 21, 1935, *Graham 10107;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10245;* Diamond Mt., 8000 ft., Aug. 5-7, 1912, *Douglass s. n.*

Solidago decumbens Greene

Infrequent at mid- or upper altitudes in the Uinta Mts. Both specimens show mature achenes.

Davis Hollow, Taylor Mt., 8700 ft., Sept. 7, 1931, *Graham 7487;* woods NE. of Paradise Park, 10,200 ft., Aug. 16, 1935, *Graham 10045.*

Solidago elongata Nutt.

The single specimen cited shows flowers and maturing achenes.

W. side of Green River, near Quarry "L," 4700 ft., Aug. 29, 1931, *Graham 7316.*

Solidago missouriensis Nutt.

Infrequent at low altitude in the central Basin. *Graham 6193* is in bud; the later number is in anthesis.

W. side of Green River, near Quarry "L," 4700 ft., June 22, 1931, *Graham 6193;* along Uinta River W. of Lapoint, 5700 ft., July 23, 1933, *Graham 8611.*

Solidago nana Nutt.

Solidago nivea Rydb.

The single specimen cited is in late anthesis.

Yellowstone (East Fork of Lake Fork) Creek, 12 mi. N. of Mountain Home, 7800 ft., Aug. 18, 1936, *Doutt 4339.*

Solidago occidentalis (Nutt.) Torr. and Gray

Euthamia occidentalis Nutt.

The single specimen cited is in anthesis.

W. side of Green River, near Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7353.*

Solidago Parryi (Gray) Greene MOUNTAIN GOLD

Aplopappus Parryi Gray

Oreochrysum Parryi (Gray) Rydb.

Infrequent in mid- and upper altitude woodlands of the Uinta Mts. Both specimens show flowers and maturing achenes.

Below Dyer Mine, 15 mi. N. of Vernal, 9000 ft., Sept. 4, 1935, *Graham 10187;* Mirror Lake, 10,000 ft., Sept. 7, 1935, *Graham 10219.*

Solidago petradoria Blake ROCK GOLDENROD

Chrysoma pumila Nutt.

Petradoria pumila (Nutt.) Greene

Frequent at low or mid-altitudes in the Uinta Mts. The specimens are in bud or early anthesis except the September number, which shows mature achenes. It was also collected (*Graham 9706*) along East Salt Creek, Colorado, on the south slope of the Book Cliffs.

Ashley Creek near mouth of Dry Fork, 6000 ft., June 23, 1931, *Graham 6288;* Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931,

Graham 6372; Davis Hollow, Taylor Mt., 8700 ft., Sept. 7, 1931, *Graham 7493;* SE. slope of Mosby Mt., 8000 ft., July 3, 1933, *Graham 8357.*

Solidago trinervata Greene

Frequent at low and mid-altitudes throughout the Basin. The specimens show flowers and maturing achenes.

Post Canyon, 7800 ft., July 28, 1935, *Graham 9897;* Post Canyon, 8000 ft., July 29, 1935, *Graham 9933a;* Chandler Canyon, 6000 ft., Aug. 3, 1935, *Graham 9979;* Brush Creek Gorge, 6500 ft., Aug. 11, 1935, *Graham 9997.*

Sonchus arvensis L. var. **glabrescens** Gunth., Grab., and Wimm.

The single specimen of this European introduction cited, collected near cultivated fields, is in fruit.

Along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7439.*

Sonchus asper (L.) Hill

The single specimen of this European species cited is in fruit.

Marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9799a.*

Sonchus oleraceus L.

The single specimen of this European introduction cited is in fruit.

Marsh, mouth of Ashley Creek, 4750 ft., July 23, 1935, *Graham 9799.*

Taraxacum officinale Weber DANDELION

Leontodon Taraxacum L.

Frequent throughout the Basin at all altitudes except the uppermost Alpine Zone. This introduced European species shows perhaps the greatest range of altitudinal tolerance of any herbaceous species in the Basin. The specimens show various stages of flower and fruit.

W. side of Green River near Quarry "L," 4700 ft., June 22, 1931, *Graham 6197;* Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6319;* up creek N. of Moon Lake, 8200 ft., July 1, 1931, *Graham 6517;* Brown Duck Lake, 10,400 ft., July 2, 1931, *Graham 6576;* along irrigation ditch W. of Vernal, 5300 ft., Sept. 4, 1931, *Graham 7435;* Davis Hollow, Taylor Mt., 8700 ft., Sept. 7, 1931, *Graham 7475;* at spring, Dinosaur Quarry, 5000 ft., April 28, 1933, *Graham 7553;* Uinta River Canyon, near Big Park, 7500 ft., June 2,

1933, *Graham 8069;* above Chain Lakes, 11,000 ft., July 20, 1933, *Graham 8538;* below Mud Springs, 8800 ft., June 29, 1935, *Graham 9485*.

Tetradymia canescens var. **inermis** (Nutt.) Gray

Tetradymia inermis Nutt.

Infrequent throughout the Basin at low and mid-altitudes. The July specimens are in flower; the later numbers show mature achenes.

Hill Creek, 5000 ft., July 26, 1935, *Graham 9822;* ridge W. of head of Post Canyon, 8000 ft., July 27, 1935, *Graham 9846;* one mile W. of Baxter Pass, Colo., 8300 ft., Aug. 29, 1935, *Graham 10154;* Red Creek, 2 mi. N. of Fruitland, 6700 ft., Aug. 16, 1936, *Doutt 4331*.

Tetradymia Nuttallii Torr. and Gray

Occasional throughout the Mixed Desert Shrub Zone where it sometimes occurs in almost solid stands over small areas; it is nowhere as common as the following species, however. The August specimen shows empty involucres; the other numbers are in flower.

Flat above Quarry "L," 4800 ft., June 20, 1931, *Graham 6152;* flat above Quarry "L," 4800 ft., Aug. 31, 1931, *Graham 7364;* desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8285*.

Tetradymia spinosa Hook. and Arn.

Common throughout the Basin at low altitude, where, with *Atriplex confertifolia*, it forms the Atriplex-Tetradymia Association which makes up a large part of the Mixed Desert Shrub Zone. It is locally called "Cat Claw" and "Horse Brush." *Doutt 894* is a vegetative specimen very probably referable to this species; the other numbers show the species to flower in May and fruit in June.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6108;* Skull Pass Quarry, 5000 ft., May 6, 1933, *Graham 7616;* desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8283;* Greasewood flat above marsh, mouth of Ashley Creek, 4750 ft., May 30, 1935, *Graham 9018;* Pariette Bench, 12 mi. SW. of Ouray, 5000 ft., June 22, 1933, *Doutt 878;* Willow Creek, 2 mi. above Thorne's ranch, 5300 ft., June 29, 1933, *Doutt 894;* Dry Run, Red Bluff Wash, Dragon-Vernal road between White and Green Rivers, June 27, 1908, *Douglass s. n.;* Ainge Gulch, 5 mi. N. of Jensen, May 29, 1912, *Peterson s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Thelesperma subnudum Gray

Collected only within a small radius at low altitude in the very center of the Basin. The specimens are in flower.

Bench W. of Green River, N. of mouth of Sand Wash, 4500 ft., May 28, 1933, *Graham 7918*, *Graham 7935;* Desert Springs, 5300 ft., May 30, 1933, *Graham 7953*.

Townsendia incana Nutt.

Common at low altitude throughout the Basin, particularly in the upper Mixed Desert Shrub Zone. For the most part the specimens show flowers, with developing achenes also on the later numbers.

Between Green River and Quarry "L," 4700 ft., June 19, 1931, *Graham 6114;* Davis Hollow, Taylor Mt., 8500 (?) ft., June 24, 1931, *Graham 6340;* W. of Dinosaur Quarry, 5000 ft., April 28, 1933, *Graham 7559a;* hills E. of Dinosaur Quarry, 5000 ft., April 29, 1933, *Graham 7563;* 10 mi. SW. of Vernal, 5000 ft., May 3, 1933, *Graham 7598;* bad lands N. of Skull Pass Quarry, 5000 ft., May 9, 1933, *Graham 7631;* 3 mi. W. of Dinosaur Quarry, 5500 ft., May 15, 1933, *Graham 7656;* 5 mi. NW. of Dinosaur Quarry, 5500 ft., May 16, 1933, *Graham 7671;* hills E. of Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7685;* Dinosaur Quarry, 5000 ft., May 17, 1933, *Graham 7709a;* Asphalt Ridge, 4 mi. SW. of Vernal, 6000 ft., May 25, 1933, *Graham 7839;* near Pariette Mine, 10 mi. SE. of Myton, 5000 ft., May 26, 1933, *Graham 7865;* bench W. of Green River, S. of mouth of Sand Wash, 5000 ft., May 29, 1933, *Graham 7946;* bench, head of Sand Wash, 5300 ft., May 30, 1933, *Graham 7961a* (on sheet with *Townsendia strigosa*, *Graham 7961b*); desert SE. of Jensen, 5500 ft., June 27, 1933 *Graham 8294;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 6000 ft., May 31, 1935, *Graham 9039;* S. side of White River, 2 mi. SE. of mouth of Wolf Creek, Colo., 5600 ft., June 2, 1935, *Graham 9092;* E. side of Green River, Island Park, 5000 ft., June 11, 1935, *Graham 9194;* E. of Dinosaur Quarry, May 29, 1912, *Peterson s. n.;* Ainge Gulch, 5 mi. N. of Jensen, May 29, 1912, *Peterson s. n.;* Uinta Basin, June 9, 1912, *Peterson s. n.*

Townsendia montana Jones

The single specimen of this Utah endemic cited, collected in a rocky opening in Lodgepole Pine forest, is in flower.

Rocky crest of E. side of Whiterocks Canyon, between Red Pine and Paradise Creeks, 10,000 ft., Aug. 17, 1935, *Graham 10065*.

Townsendia strigosa Nutt.

Scarce in the Basin, where it occurs at low altitude. The early specimen shows flowers; the later one exhibits mature achenes.

Bench, head of Sand Wash, 5300 ft., May 30, 1933, *Graham 7961b* (on sheet with *Townsendia incana*, *Graham 7961a*); Uinta Basin, July 13, 1912, *Peterson s. n.*

Tragopogon dubius Scop. SALSIFY, OYSTER PLANT

The specimens of this cultivated species all show mature achenes, and are questionably determined.

Davis Hollow, Taylor Mt., 8500 ft., June 24, 1931, *Graham 6378;* middle fork of Stuart Creek, Colo., 7500 ft., July 18, 1935, *Graham 9746;* in yard, Vernal, 5300 ft., July, 1935, *Graham 10272.*

Viguiera multiflora (Nutt.) Blake

Gymnolomia multiflora Benth. and Hook.
Heliomeris multiflora Nutt.

Common at mid-altitude, in Aspen woodland and open Sagebrush, on the Tavaputs Plateau. It was not collected in the Uinta Mts. The specimens all show flowers.

Head of West Fork of Douglas Creek, Colo., 7700 ft., July 16, 1935, *Graham 9693;* upper middle fork of Stuart Creek, Colo., 7500 ft., July 18, 1935, *Graham 9749;* ridge W. of head of Post Canyon, 8000 ft., July 27, 1935, *Graham 9851;* Post Canyon, 7800 ft., July 28, 1935, *Graham 9898;* head of Hill Creek, 8500 ft., July 31, 1935, *Graham 9947;* one mile W. of Baxter Pass, Colo., 8300 ft., Aug. 29, 1935, *Graham 10152;* upper Bitter Creek, 3 mi. E. of Utah-Colorado state line, 7800 ft., Aug. 30, 1935, *Graham 10171.*

Wyethia amplexicaulis Nutt. MULE EARS

The single flowering specimen cited was collected at the extreme west end of the Basin along a road in the Aspen Zone.

Horse Creek, 7700 ft., June 18, 1935, *Graham 9254.*

Wyethia scabra Hook.

Occasional at low altitude in the central Basin. The specimens are in late anthesis.

Desert SE. of Jensen, 5500 ft., June 27, 1933, *Graham 8277;* Devil's Playground, between White and Green Rivers, June 23, 1908, *Douglass s. n.;* Uinta Basin, July 5, 1912, *Peterson s. n.;* Uinta Basin, July 6, 1912, *Peterson s. n.*

Xanthium saccharatum Wallr. COCKLEBUR, CLOTBUR

Xanthium pennsylvanicum Wallr.

Collected only at the locality cited, where it grew under Cottonwoods on the sometimes inundated river flood-plain. The specimens are in fruit.

Species of Xanthium, especially in the seedling stage, are poisonous to stock, particularly to hogs. The spiny fruits or burs are believed to cause mechanical injury also, when eaten.

W. side of Green River, near Quarry "L," 4700 ft., Aug. 30, 1931, *Graham 7344;* W. side of Green River, near Quarry "L," 4700 ft., Sept. 11, 1935, *Graham 10261.*

SUMMARY OF ANNOTATED LIST

Family	Genera	Species	Varieties of Species Listed	Varieties of Species Not Listed
Equisetaceae	1	4		
Selaginellaceae	1	3		
Isoetaceae	1	1		
Polypodiaceae	5	5		1
Pinaceae	5	11		
Ephedraceae	1	3		
Typhaceae	1	1		
Sparganiaceae	1	2		
Potamogetonaceae	1	1		
Scheuchzeriaceae	1	1		
Alismataceae	1	1		
Gramineae	33	86	6	1
Cyperaceae	5	54		2
Juncaceae	2	14	1	2
Liliaceae	11	17		1
Iridaceae	2	2		
Orchidaceae	6	9		
Salicaceae	2	20	2	2
Betulaceae	2	3		
Fagaceae	1	4		
Ulmaceae	1	1		
Urticaceae	1	2		
Santalaceae	1	1		
Polygonaceae	4	36	3	
Chenopodiaceae	11	25		1
Amaranthaceae	1	3		
Nyctaginaceae	4	5		
Portulacaceae	2	2		
Caryophyllaceae	8	22		1
Nymphaeaceae	1	1		
Ranunculaceae	11	31		5
Berberidaceae	1	1		

Family	Genera	Species	Varieties of Species Listed	Varieties of Species Not Listed
Papaveraceae	1	2		
Capparidaceae	3	4		
Cruciferae	23	49	4	6
Crassulaceae	2	2		
Saxifragaceae	7	19		3
Rosaceae	20	49		1
Leguminosae	13	59	1	3
Geraniaceae	1	2		
Linaceae	1	1		1
Euphorbiaceae	2	3		
Callitrichaceae	1	1		
Anacardiaceae	2	2		
Celastraceae	2	2		
Aceraceae	1	3		
Rhamnaceae	2	4		
Malvaceae	3	5		
Guttiferae	1	1		
Tamaricaceae	1	1		
Violaceae	1	6		2
Loasaceae	1	3		
Cactaceae	7	14		
Elaeagnaceae	1	2		
Lythraceae	1	1		
Oenotheraceae	3	20	2	5
Hippuridaceae	1	1		
Umbelliferae	10	25	1	1
Cornaceae	1	1		
Pyrolaceae	1	3		
Ericaceae	6	11		
Primulaceae	3	5		
Oleaceae	1	2		
Gentianaceae	3	10		
Apocynaceae	2	4		
Asclepiadaceae	1	3		
Convolvulaceae	2	3		
Polemoniaceae	7	26	1	1
Hydrophyllaceae	5	8	3	3
Boraginaceae	7	27	1	4
Verbenaceae	2	2		
Labiatae	9	10		
Solanaceae	3	3		
Scrophulariaceae	10	44	1	2
Orobanchaceae	2	2		
Plantaginaceae	1	3		
Rubiaceae	1	5		1
Caprifoliaceae	3	8		
Valerianaceae	1	3		
Campanulaceae	1	2		
Compositae	50	163	7	21
Totals	362	1001	33	70

Total number of Species and Varieties treated 1104

In addition to the species given in the Annotated List above there were collected on the outward Basin slopes by the Carnegie Museum Botanical Expeditions the following species which were not found inside the Uinta Basin proper as defined in the present work:

Eleocharis acicularis (L.) R. and S. var. *occidentalis* Svenson (*Graham 10197*) on the south slope in Green Lake.

Arabis microphylla Nutt. (*Graham 8094*) on the north slope in Jackson Draw.

Lupinus ammophilus (*Graham 9102*) on the east slope 4 miles NW. of Meeker, Colorado.

Callirrhoe alcaeoides (Michx.) Gray (*Graham 9708*) on the east slope near Rio Blanco, Colorado.

Phymosia rivularis (Dougl.) Rydb. (*Graham 9640*) on the south slope along Willow Creek, south of Mud Springs.

Myriophyllum spicatum L. (*Graham 10196*) on the north slope in Green Lake.

Cogswellia leptocarpa (Nutt.) Jones (*Graham 9103*) on the east slope at the head of Strawberry Creek, Colorado.

Leptotaenia multifida Nutt. (*Graham 8113*) on the north slope in Jackson Draw.

Gilia calcarea Jones (*Graham 8108*) on the north slope in Jackson Draw.

Cynoglossum officinale L. (*Graham 9232*) on the west slope along Diamond Creek.

Marrubium vulgare L. (*Graham 9528*) on the south slope near the head of Soldier Creek.

Penstemon Eatoni Gray (*Graham 8339b*) on the south slope in Pine Canyon; (*Graham 9639*) on the south slope along Willow Creek, south of Mud Springs; and (*Graham 9230*) on the west slope 2 miles west of West Portal.

Senecio werneriaefolius Gray (*Graham 8112*) on the north slope in Jackson Draw.

CONCLUSION

GEOGRAPHIC AFFINITY OF THE FLORA

It will be observed from the above summary of the annotated list that in the present work there are treated 81 families, 362 genera, and a total of 1,104 entities consisting of species and varieties. A detailed phytogeographic study, based upon these data and other information collected during the preparation of the present work, is now in progress. However, a few data relating to distribution may now be given. For example, slightly more than 10 per cent of the species listed are Old World species, one-third of which are arctic-alpine forms, and two-thirds widely distributed weeds. An additional 15 per cent of the total flora is widely distributed throughout the United States, one-third of these being confined to the region west of the Mississippi River. The remaining 75 per cent of the total flora is related to that part of North America which lies between the Rocky Mountain uplift and the Pacific Coast. The relation of the Uinta Basin flora to contiguous areas is very interesting, but due to the fact that in such areas one must deal with a great number of decidedly different altitudinal zones or layers of plants, comparative data without recognition of these altitudinal complexities are of little value. Much time will have to be spent compiling such data accurately, but it is of general interest that only a small percentage, about three per cent, of the Uinta Basin flora is of Great Plains affinity, and that nearly one-fourth, or about 21 per cent, of the total number of species listed for the Basin represent species of the northern Rocky Mountains and the Northwest. An additional 10 per cent occur throughout the entire Rocky Mountain area, 10 per cent more are southern Rocky Mountain forms, and about 11 per cent are central Rocky Mountain species, of which nearly one-third are Utah endemics. The central Rocky Mountain area is considered to include contiguous parts of Utah, Colorado, and Wyoming. Of the remaining 20 per cent more than half are generally distributed from the Rocky Mountains to the West Coast, and the others are primarily Great Basin forms.

It would therefore seem that the flora of the Uinta Basin has drawn its members from many adjacent regions, with a somewhat heavy percentage from the north. Differences in altitude must here be remembered, however. The Great Basin element, which is pre-

dominant at low altitudes in the Uinta Basin, is not particularly rich in species, although certain of these species, such as the chenopodiaceous desert shrubs, occur in great numbers, lending character to the landscape and probably numbering more individuals than any floristic element of the Basin, except the upper altitude conifers. In the mid- and upper altitudes, however, there is greater variation in vegetative structure and more species occur, which may explain the apparently strong northern affinity of the Uinta Basin flora as a whole.

ENDEMISM

The following species represented in our list are endemic to Utah, and those found only in the Uinta Basin are so indicated:

Eriogonum aureum
Eriogonum medium
Eriogonum Porteri
Lychnis Kingii
Draba uncinalis
Lesquerella utahensis
Parrya platycarpa
Physaria Grahami—Uinta Basin only
Thelypodium suffrutescens—Uinta Basin only
Astragalus Coltoni
Astragalus cymboides
Astragalus detritalis—Uinta Basin only
Lupinus barbiger
Psoralea stenostachys
Linum Kingii sedoides
Utahia Sileri
Oenothera caespitosa var. Jonesii
Cymopterus duchesnensis—Uinta Basin only
Asclepias labriformis
Gilia McVickerae
Gilia stenothyrsa—Uinta Basin only
Cryptantha breviflora—Uinta Basin only
Cryptantha Grahamii—Uinta Basin only
Cryptantha sp.—Uinta Basin only
Castilleja Leonardi
Castilleja viscida

Penstemon carnosus
Penstemon Grahami—Uinta Basin only
Penstemon pachyphyllus
Penstemon uintahensis—Uinta Basin only
Bahia ourolepis
Chrysothamnus nauseosus salicifolius
Gaillardia flava
Parthenium alpinum var. ligulatum—Uinta Basin only
Senecio ambrosioides var. indivisus—Uinta Basin only (from Colorado)
Townsendia montana

The above list shows the number of Uinta Basin endemics to be twelve, or less than one per cent of the total number of species in the area. It will be noted, however, that the greater number of Utah endemics, and that holds also for the Uinta Basin as a unit, are species of low altitude. Of the twelve Uinta Basin endemics, only one, *Penstemon uintahensis*, is a high altitude species. This phenomenon is probably explained by the fact that while the Wasatch, Uinta, and Rocky Mountains were undergoing local Pleistocene glaciation, arctic-alpine species had an opportunity to spread widely throughout this region at the lower edge of the glaciers, later receding to the summits of the mountains as the ice melted. The result is an alpine flora of similar composition throughout the three mountain systems. However, what was going on in the desert areas during Pleistocene time is another story. As local glaciation is not believed to have wide-reaching effects, and since surrounding areas might have had an even drier climate during glaciation than at other times, it may be presumed that the desert vegetation at low altitudes persisted throughout the Pleistocene glacial period. The Uinta Mountain glaciers extended only half-way from their sources southward toward the center of the Basin (see Atwood 1909), and the Tavaputs Plateau was never glaciated. Consequently there was an extensive area in the center of the Uinta Basin where desert plants might have persisted unchanged from some pre-Pleistocene time. Access to the Basin for this desert element might previously have been, as now, along the channel of the Green River, where, in open country or in deeply trenched canyons where the stream cuts the Uintas and the Tavaputs Plateau, desert conditions exist along its entire course from the Sagebrush-covered Bridger Basin north of the Uinta Mountains

to the Mat Atriplex deserts south of the Tavaputs Plateau. So through this longer period of time available for continued undisturbed occupation, the low altitude areas of the Uinta Basin have permitted the development of a richer endemism than the mountains.

Of the Uinta Basin endemics listed, some, like *Physaria Grahami*, are probably the result of isolation, as they occur in the deep, rugged side-canyons which stretch from the Green River back into the uplands which the river trenches. The majority, however, seem to be edaphic forms which owe their unique character to the widespread Eocene Green River shales which outcrop throughout the southern half of the Basin.

It is also interesting to note that many species are known from the north slope of the Uinta Mountains which are apparently absent from the south slope. These may well represent northern mid-altitude species which have been unable to enter the Basin by the Green River's low altitude course, and, on the other hand, have been unable to cross the alpine barrier of the high mountain range.

RANGE EXTENSIONS

The following species are believed to be reported from Utah or from Colorado for the first time, and so represent extensions of range as indicated in the annotated list:

Agrostis humilis
Eleocharis Bolanderi
Eleocharis calva
Eriophorum Chamissonis
Eriophorum Scheuchzeri
Luzula Piperi
Cypripedium fasciculatum
Eriogonum Batemani (from Colorado)
Bassia hyssopifolia
Delphinium dumetorum
Descurainia halictorum var. osmiarum
Descurainia serrata
Lesquerella condensata var. laevis
Ribes oxyacanthoides
Ribes setosum
Crataegus erythropoda (from Colorado)

Potentilla viridescens
Astragalus bisulcatus
Astragalus inflexus
Oxytropis multiceps minor
Coryphantha neo-mexicana
Coryphantha vivipara
Neolloydia texensis
Opuntia juniperina
Opuntia phaeacantha
Cogswellia nevadensis var. Parishii (from Colorado)
Cymopterus planosus
Arctostaphylos nevadensis
Collomia grandiflora (from Colorado)
Gilia pinnatifida
Phlox Hoodii
Phlox muscoides
Phacelia glandulosa var. deserta (from Colorado)
Phacelia heterophylla forma frigida (from Colorado)
Castilleja pulchella
Penstemon Fremontii
Penstemon Osterhoutii
Cirsium megacephalum
Cirsium polyphyllum
Kuhnia rosmarinifolia

NEW SPECIES AND VARIETIES

The following novelties are described in the present work or are described elsewhere but based upon collections made during the preparation of this work:

Physaria Grahami Morton, see page 220.

Thelypodium suffrutescens Rollins, see page 224.

Cryptantha Grahamii Johnston, see Journ. Arnold Arboretum **18**: 23. 1937.

Mertensia arizonica var. **Grahami** Williams, see Ann. Mo. Bot. Gard. **24**: 65. 1937.

Penstemon carnosus Pennell, see page 329.

Penstemon Grahami Keck, see page 331.

Senecio ambrosioides var. **indivisus** Greenman, see page 375.

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PHOTOGRAPHIC DATA FOR THE FOLLOWING PLATES

The numbers refer to negative numbers in the author's personal photographic collection; those marked 5 x 7 were made with a five by seven inch Conley view camera; those marked 2¼ x 3¼ were made with a two and one-quarter by three and one-quarter inch Graflex camera. The stop system is US for 5 x 7 and F for 2¼ x 3¼; the film is Agfa Super Plenachrome.

PLATE II, FIG. 1. No. D-8, 5 x 7, ¾ sec. at 64, bright sun, 9:15 A.M., August 27, 1935.
FIG. 2. No. A-11, 5 x 7, 5 sec. at 32-64, medium sun, K-2 filter, June 4, 1935.

PLATE III, FIG. 1. No. B-4, 5 x 7, 1½ sec. at 64, bright sun, 9:00 A.M., June 18, 1935.
FIG. 2. No. 2892, 2¼ x 3¼, 1/30 sec. at 16-22, bright sun, K-2 filter, 9:30 A.M., July 27, 1935.

PLATE IV, FIG. 1. No. 2926, 2¼ x 3¼, 1/20 sec. at 8, medium sun, 10:30 A.M., August 11, 1935.
FIG. 2. No. B-3, 5 x 7, 1½-2 sec. at 64, bright sun, 8:30 A.M., June 18, 1935.

PLATE V, FIG. 1. No. C-9, 5 x 7, 3 sec. at 64, bright sun, 10:00 A.M., August 18, 1935.
FIG. 2. No. C-11, 5 x 7, 2 sec. at 64, 9:00 A.M., August 19, 1935.

PLATE VI, FIG. 1. No. D-2, 5 x 7, 2 sec. at 64, bright sun, K-2 filter, 10:30 A.M., August 21, 1935.
FIG. 2. No. D-11, 5 x 7, 2 sec. at 64, bright sun, 12 noon, August 27, 1935.

PLATE VII, FIG. 1. No. C-4, 5 x 7, 2 sec. at 64, bright sun, K-2 filter, 11:00 A.M., July 24, 1935.
FIG. 2. No. 2873, 2¼ x 3¼, 1/25 sec. at 22, bright sun, 8:30 A.M., July 24, 1935.

PLATE VIII, FIG. 1. No. D-10, 5 x 7, 1/5 sec. at 64, bright sun, 10:30 A.M., August 27, 1935.
FIG. 2. No. 1839, 2¼ x 3¼, 1/15 sec. at 16-22, bright sun, 11:30 A.M., May 19, 1933.

PLATE IX, FIG. 1. No. 2761, 2¼ x 3¼, 1/30 sec. at 16, bright sun, 9:00 A.M., May 27, 1935.
FIG. 2. No. 1759, 2¼ x 3¼, 1/15 sec. at 16, cloudy, April 27, 1933.

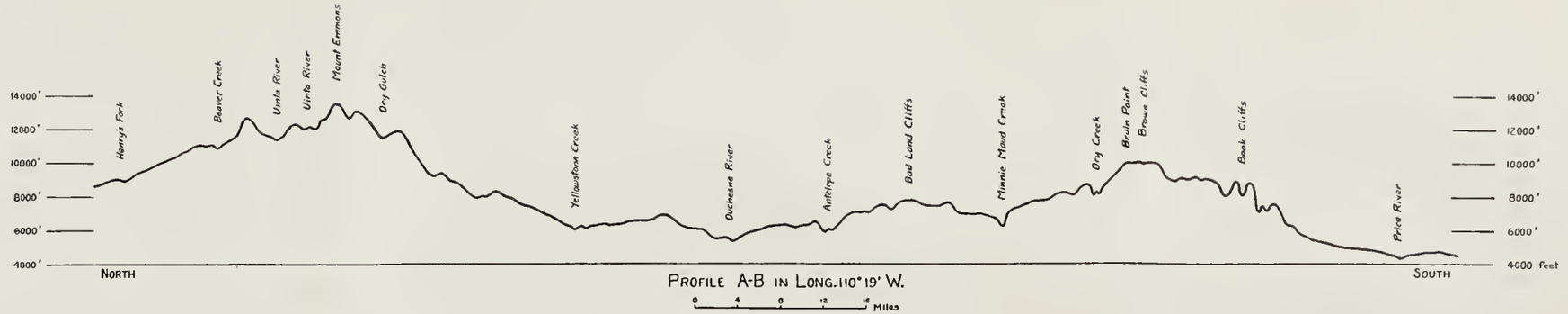
PLATE X, FIG. 1. No. B-1, 5 x 7, 2 sec. at 64-128, bright sun, K-2 filter, 12 noon, May 30, 1933.
FIG. 2. No. E-7, 5 x 7, 1 sec. at 64, bright sun, 9:30 A.M., September 11, 1935.

PLATE XI, FIG. 1. No. A-2, 5 x 7, 6 sec. at 64, cloudy, 3:00 P.M., May 11, 1935.
FIG. 2. No. A-8, 5 x 7, 8-10 sec. at 64, cloudy, 6 P.M., May 26, 1935.

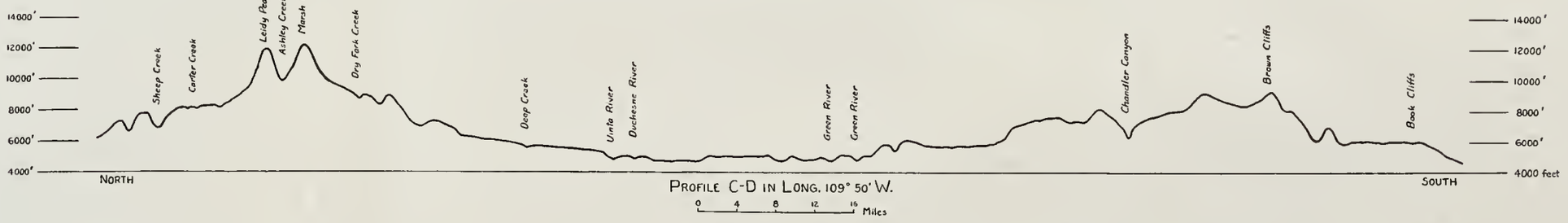
PLATE XII, FIG. 1. No. B-6, 5 x 7, 4 sec. at 64, bright sun, 3:00 P.M., July 6, 1933.
FIG. 2. No. 2949, 2¼ x 3¼, 1/25 sec. at 16, K-2 filter, 2:00 P.M., August 20, 1935.

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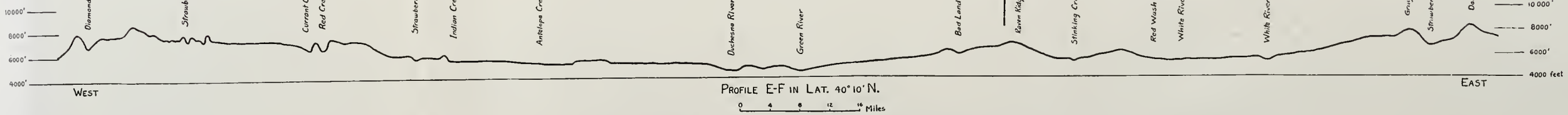
UINTA BASIN



PROFILE A-B IN LONG. 110° 19' W.



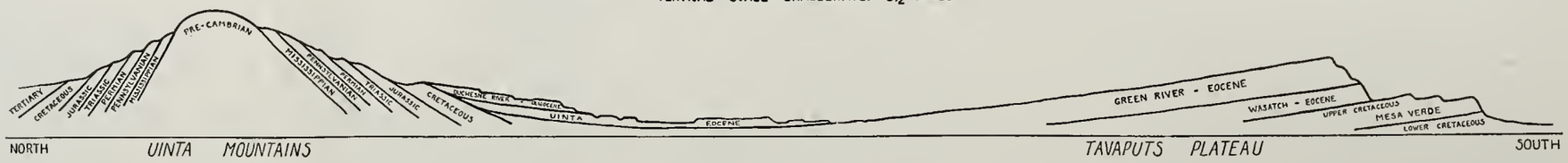
PROFILE C-D IN LONG. 109° 50' W.



PROFILE E-F IN LAT. 40° 10' N.

TOPOGRAPHIC PROFILES ACROSS THE UINTA BASIN

VERTICAL SCALE EXAGGERATED 8½ TIMES



DIAGRAMMATIC GEOLOGIC CROSS SECTION OF THE UINTA BASIN

APPROXIMATELY ALONG PROFILE C-D



FIG. 1. Atriplex-Tetradymia Association, illustrating the Mixed Desert Shrub Zone. Bench south of Jensen, near Locality No. 21. Alt. 5500 ft. See pages 67 and 45.



FIG. 2. Juniperus-Pinus Association or Juniper-Pinyon Zone. Looking northeast from Deep Channel Creek at Locality No. 65. Alt. 6400 ft. *Artemisia tridentata* in the immediate foreground. See pages 70 and 46.



FIG. 1. Mid-altitude Artemisia Association or Sub-montane Shrub Zone. Looking southeast from Horse Creek at Locality No. 68. Alt. 7700 ft. *Artemisia cana* with scattered trees of *Populus aurea*. See pages 71 and 47.



FIG. 2. Fir-Aspen-Sub-montane Shrub Zone. Head of Florence Canyon looking southwest near Locality No. 79. Alt. 8200 ft. *Abies lasiocarpa* in distance, *Populus aurea* in middle distance, and *Artemisia tridentata* in foreground. See page 48.

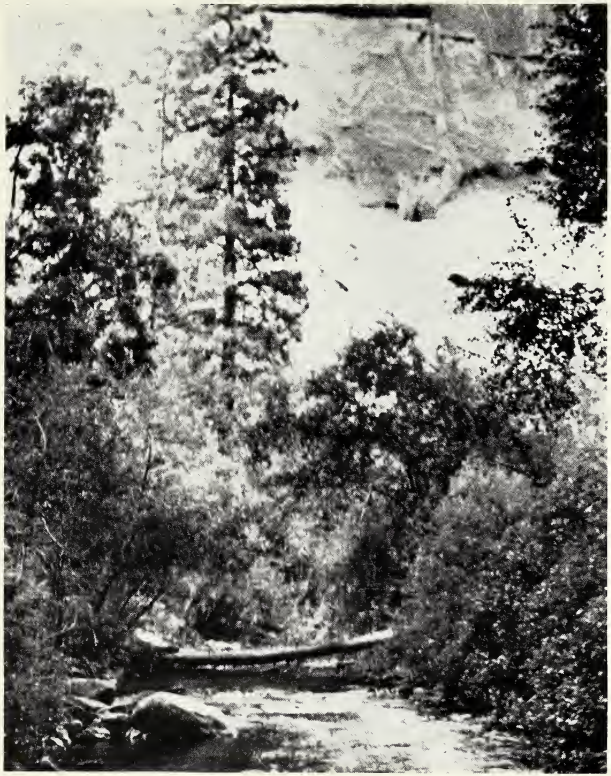


FIG 1. Mid-altitude Valley. Brush Creek near Locality No. 83. Alt. 6500 ft. *Pseudo-tsuga mucronata, Acer interior, Cornus instolonea* etc. See page 73.

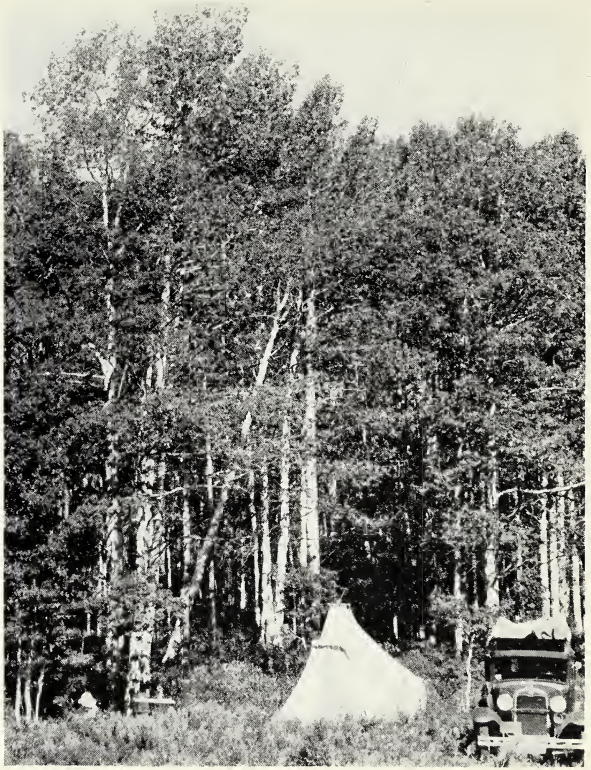


FIG. 2. *Populus aurea* Association or Aspen Zone. Horse Creek at Locality No. 68. Alt. 7700 ft. *Artemisia cana* in the foreground. See pages 75 and 51.



FIG. 1. *Pinus Murrayana* Association or Lodgepole Pine Zone. Below Paradise Park, south of Locality No. 49. Alt. 9500 ft. Trees 90 to 125 years old. See pages 77 and 52.



FIG. 2. Picea-Abies Association or Spruce-Fir Zone. Paradise Park at Locality No. 49. Alt. 10,000 ft. Trees here all *Picea Engelmanni*. See pages 79 and 53.



FIG. 1. Sieversia-Carex Association or Alpine Zone. Head of West Fork of Whiterocks River, looking south from near Locality No. 85. Alt. 11,500 ft. Forest of *Picea Engelmanni* in distance. See pages 80 and 53.



FIG. 2. Cottonwood River Flood-plain. White River near mouth of Evacuation Creek. Alt. 5000 ft. Low shrubs in background principally Rhus and Rosa. See page 63.



FIG. 1. Scirpus-Typha Swamp. West side of Green River near mouth of Ashley Creek, at Locality No. 63. Alt. 4700 ft. See page 63.



FIG. 2. Distichlis Meadow. Green River flood-plain near mouth of Ashley Creek, at Locality No. 63. Alt. 4700 ft. Cottonwood River Flood-plain in distance. See page 64.



FIG. 1. Bad Lands. North of Bonanza. Alt. 5500 ft. *Sarcobatus vermiculatus* in left foreground. See page 64.



FIG. 2. Desert Gulch. Upper limit of gulch with typical conditions developing in left foreground. West of Dinosaur Quarry near Locality No. 18. Alt. 5500 ft. See page 65.



FIG. 1. Sarcobatus Association. Bitter Creek flood-plain northeast of Locality No. 62. Alt. 6000 ft. See page 65.

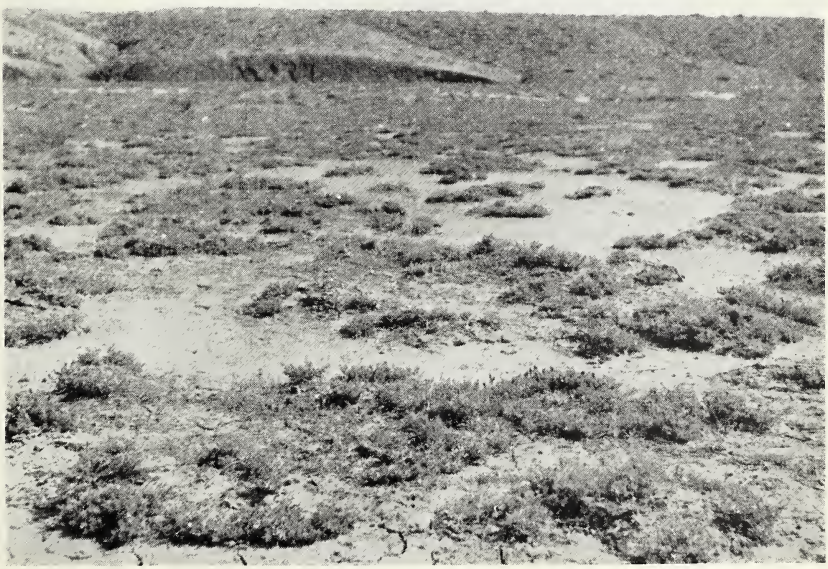


FIG. 2. Mat Atriplex Association. South of Vernal near Locality No. 17. Alt. 5000 ft. See page 66.



FIG. 1. Kochia-Hilaria Association. Pariette Bench near Locality No. 29. Alt. 5000 ft. See page 66.

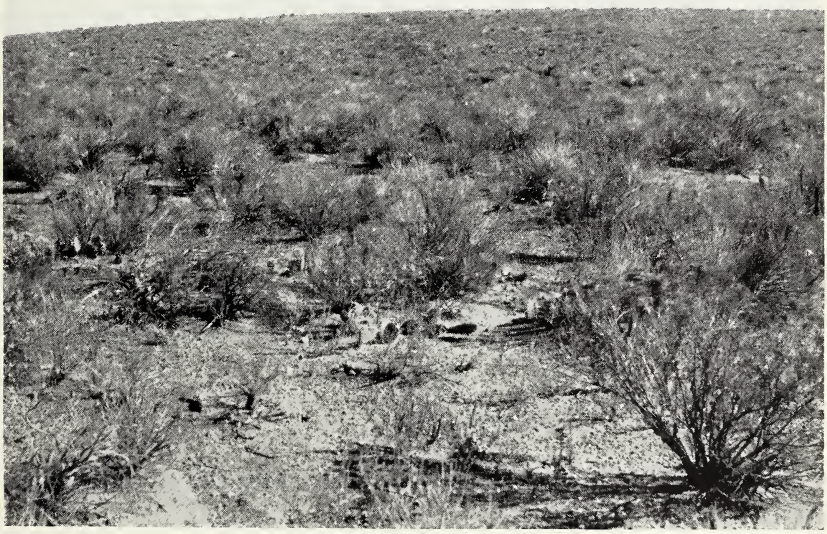


FIG. 2. Chrysothamnus Association. Leota Bench near Locality No. 3. Alt. 4800 ft. See page 67.



FIG. 1. Low Altitude Artemisia Association. Along Vernal-Lapoint road west of Asphalt Ridge. Alt. 5500 ft. *Artemisia tridentata* with *Juniperus utahensis* on distant hill and in right foreground. See page 69.



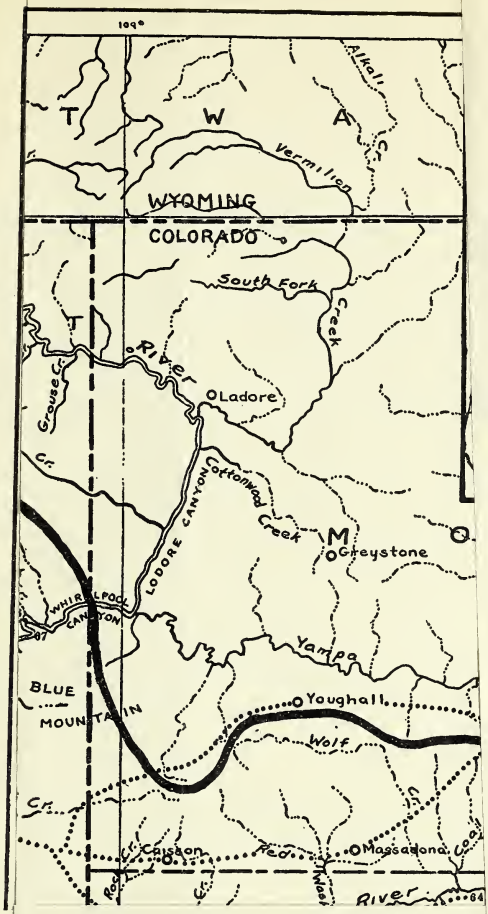
FIG. 2. Eurotia Association. West of Bitter Creek at Locality No. 62. Alt. 6300 ft. Sagebrush on slope in right background with Juniper and Pinyon in left distance. See page 70.

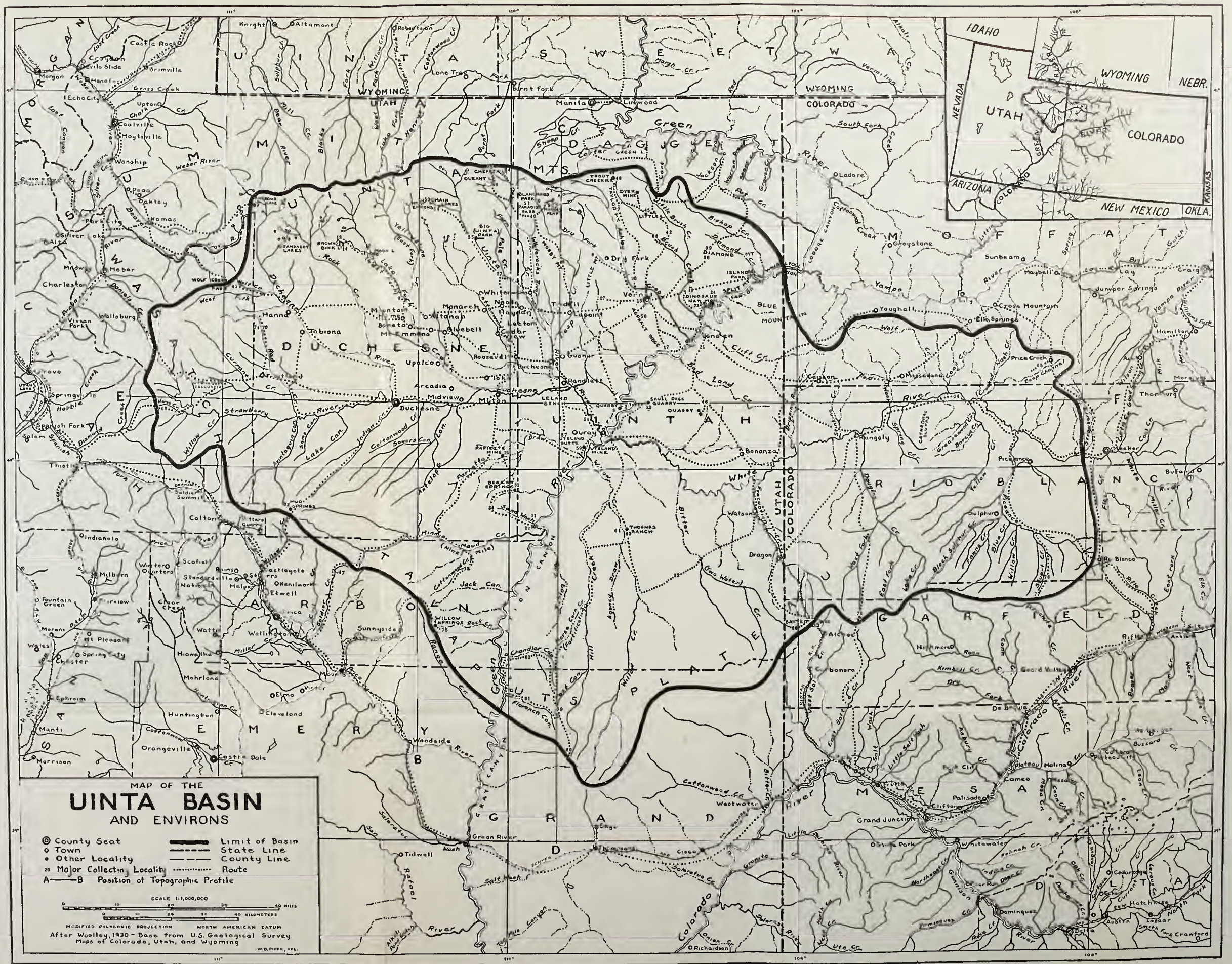


FIG. 1. Upper Altitude Lake. East of Paradise Park, near Locality No. 49. Alt. 10,000 ft. *Nymphaea polysepala* on the water, *Eleocharis palustris* var. *major* in water's edge, *Salix planifolia* on bank, and Spruce-Fir forest beyond. See page 77.



FIG. 2. Upper Altitude Meadow. Trail over glacial moraine southeast of Chepeta Lake near Locality No. 84. Alt. 10,500 ft. Spruce-Fir forest in background. See page 78.


109°
T
W
A
Alkali
Vermilion
WYOMING
COLORADO
South Fork
Creek
River
Ladore
Grouse Cr.
Cottonwood Creek
LODORE CANYON
M
Greystone
WHIRLPOOL CANYON
Yampa
BLUE
MOUNTAIN
Youghall
Wolf
Cr.
Carson
Red
Massadona
Green
River
84



MAP OF THE

UINTA BASIN

AND ENVIRONS

◎ County Seat
o Town
• Other Locality
28 Major Collecting Locality
A——B Position of Topographic Profile

Limit of Basin
State Line
County Line
Route

SCALE 1:1,000,000

0 10 20 30 40 MILES
0 10 20 30 40 KILOMETERS

MODIFIED POLYCONIC PROJECTION NORTH AMERICAN DATUM

After Woolley, 1930 - Base from U.S. Geological Survey Maps of Colorado, Utah, and Wyoming

W.D. PIPER, DEL.

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Synonyms are in italics; names of families are in bold face.

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